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Tabby in the Coastal Southeast: the Culture History of an American Building Material.

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TABBY IN THE COASTAL SOUTHEAST: THE CULTURE HISTORY OF AN AMERICAN BUILDING MATERIAL

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ABSTRACT

Building materials, construction methods, and housing forms have been long appreciated as being vital components of settlement. The selection of design, material, and methods of construction employed within any architectural tradition are culturally established decisions which reflect a variety of considerations. Among the more binding determinants are the technological skills, available tools, cultural traditions and preferences, the cost and availability of suitable building materials, and the perceived function of the structure or structures under consideration. An understanding of the manifestations of these factors provides the geographer with useful knowledge of cultural processes at work, and the means by which cultural landscapes evolve.

Tabby, a type of concrete constituted of shell, lime and sand, was the first concrete material made and utilized in the United States, predating the development of concrete made with Portland cement by as many as 175 years. The tradition for tabby construction in this country was fostered by two cultures: initially the Spanish in St. Augustine, Florida and later the English and Americans in coastal South Carolina, Georgia, and Florida. Documents and archaeological data provide early dates for tabby's use. The oldest physical evidence of the material has been dated to the 1670s, though 1580 documentary sources have indicated an even earlier presence. It attained its greatest popularity in the eighteenth and early nineteenth centuries. The demise of the tradition began with the Civil War; 1920

is the last known date of new tabby construction. Maps of the spacial distribution of tabby indicate its presence on nearly all the Sea Islands and adjacent mainland areas from Charleston, South Carolina to St. Augustine, Florida and a secondary minor occurence in the Manatee River region of Florida's Gulf coast. This distributional pattern would seem to be represenative of diffusion from two primary and one secondary centers or hearths. Primary hearths were located at St. Augustine, Florida and Charleston-Beaufort, South Carolina and the secondary hearth at St. Simons Island, Georgia. These centers represent core areas for the development of the Spanish and English-American tabby traditions.

Data derived from St. Augustine records, archaeological excavations, and linguistics, generally support the concept of a New World derivation of tabby. It is thought to be a Spanish development, originating either in Florida or on the Spanish-occupied islands of the Caribbean. The antecedents of tabby would seem to be Old World materials. The Mediterranean building earths, tapia and tabia, Spanish roof mortars and Roman concrete appear to have had the greatest influence on its development. The constructional uses of tabby indicate a strong tie to the Old World, and were undoubtedly Mediterranean in origin. Tabby wall-building procedures were the same as those used for tapia and tapia real. The flat Spanish azotea roofs, whether of tabby or a weak mortar mixture, were constructed in a similar manner, and tabby floors were built according to contemporary standards of floor construction.

Once it was developed, a number of circumstances favored tabby's adoption in its realm of utilization. The economic factors influenc-

ing its selection and use included the low cost and easy access to component materials, the low cost of building with tabby and its strength, durability and relative resistance to fire. Important social and political factors would seem to include the Spaniard's familiarity with the use of tapia and tapia real in construction, the resemblance of well made tabby to prestigious stone material, and the political-military conflicts, that marked the era.

Chapter I

INTRODUCTION

The discovery of a natural hydraulic cement on the Isle of Sheppy in the year 1796 and the subsequent development of the artificial hydraulic cement known as Portland cement in 1824 heralded the age of concrete construction in the British Isles. Constituent materials for the making of Portland cement were discovered in the United States during the construction of the Erie Canal in the mid-1820s. The new type of cement was employed in construction of poured concrete buildings in this country as early as 1835, but its use in this capacity was infrequent until the late 1870s. These nineteenth century events, while important to the history of concrete in the United States, represent only one segment of the building material's history and nature.

Tabby, a type of concrete constituted of shell, lime, and sand, was the first concrete material made and utilized in America. Its use in this country dates at least to the mid-sevententh century; clearly, the material predates the development of Portland cement by more than a century and a half. Tabby in the United States was limited in its geographical distribution to sections of the Southeastern coastal region. Historically, its distribution included the Sea Islands and adjacent coastal areas of Georgia northward to Charleston, South Carolina, and southward to St. Augustine, Florida. A secondary and minor occurrence developed in the Manatee River region of Florida's Gulf Coast.

Scope and Purpose

The majority of works pertaining to vernacular architecture in the Southeastern United States have focused upon wood as a construction medium, while relatively minor attention has been devoted to other building forms. It is understandable that an emphasis on wood should emerge; historically, it has been the basic raw material employed in southern architecture. The building material played a significant role in both construction on the southern seaboard and on the westward moving frontier. Contemporary housing reflects strongly the historical preference. Wood-built structures, many of which represent traditional types and methods of building, still remain as elements of the southern rural cultural landscape. Their numbers are diminishing, however; increasingly, the trend has been toward replacing the older wooden building with structures of metal, brick, or cinderblock. In view of the latter circumstance, there has been a certain amount of urgency involved in the study of southern wood housing. Fortunately, work in this area is fairly advanced, though there remains a stated need for additional research.[1]

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[1]The interest in wood exhibited by cultural geographers, architectural historians, and folk life specialists has resulted in a substantial volume of published literature. Major contributions include the following: Fred B. Kniffen and Henry Glassie, "Building in Wood in the Eastern United States: A Time-Place Perspective," The Geographical Review, 56 (January 1966): 40-66; Fred B. Kniffen, "Folk Housing: Key to Diffusion," Annals, Association of American Geographers, 55 (December 1965): 449-477; Fred B. Kniffen, "Louisiana House Types," Annals, Association of American Geographers, 26 (December 1936): 179-193; Eugene M. Wilson, "The Single-Pen Log House in the South," Pioneer America, 2 (January 1970): 21-28; Martin Wright, "The Antecedents of the Double Pen House Type," Annals, Association of American Geographers, 48 (June 1958): 109-117; and Wilbur Zelinsky, "The Log House in Georgia," The Geographical Review, 53 (April 1953): 173-193.

Despite important progress, considerably more information is needed in order to interpret more fully the history of southern settlement. Studies must be made of the building materials that competed with wood, indeed, in some areas, surpassed wood in popularity. Research on tabby, as outlined in this work, conforms to this objective. The study is designed to provide detailed historical and geographical data on the nature of tabby, the associated methods of construction, and its origin and diffusion. In addition, it is hoped that some insight may be gained into the factors responsible for tabby's development and adoption. Some of the questions to be examined include: Did tabby's development take place in outpost settlements of New Spain? Was tabby an Old World building material and simply readapted to New World conditions? What were the political, social, and economic factors favoring the selection and use of the material? What factors restricted its spread beyond the limits of actual distribution?

Methodological Approaches

Cultural geographers have long appreciated the significance of building materials, construction methods, and housing forms as being vital components of settlement. For most observers, the initial impression of a settlement is visually dominated by the material construction of the component structures. The material aspect is basic,

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Some additional published works on southern wood construction include: Henry Glassie, "The Appalachian Log Cabin," Mountain Life and Work, 39 (Winter 1963): 5-14; "Building a Log Cabin," in Eliot Wigginton, ed., The Foxfire Book (Garden City, N.J.: Doubleday & Co., 1972), 53-107; Goodloe Stuck, "Log Houses in Northwest Louisiana," Louisiana Studies, 10 (1971): 225-237; Yvonne Philips, "The Bousillage House," Louisiana Studies, 3 (Spring 1964): 155-158; and William H. Davidson, Pine Log and Greek Revival: Houses and People of Three Counties in Georgia and Alabama (Alexander City, Alabama: Chattahoochee Valley Historical Society,) Pub. 6, 1965.

and with the added elements of form and function, gives identifiable character to a building complex. The selection of form (design), building material, and the methods of construction employed within any architectural tradition are culturally established decisions which reflect a variety of considerations. Among the more binding determinants are the technological skills, available tools, cultural traditions and preferences, the availability of suitable building materials, and the perceived function of the structure or structures under consideration. An understanding of the manifestations of these factors provides the geographer with useful knowledge of cultural processes at work, the means by which cultural landscapes evolve, and the morphology of a culture area.[1]

Construction materials, in addition to building techniques and housing forms, may be further considered in the context of distinct culture traits which have a location and time or origin, a history of diffusion, a distributional pattern, and cultural significance as elements of landscape and of human use. There is considerable precedent for studies of this nature in the geographical literature.[2] It is this methodological approach which is to be emphasized in this study of tabby housing.

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[1]Charles F. Gritzner, "Construction Materials in a Folk Housing Tradition: Considerations Governing Their Selection in New Mexico," Pioneer America, 6 (January 1974), pp. 25, 37-38.

[2]Examples are: John Winberry, "The Log House in Mexico, "Annals 64 (March 1974): 54-69; Martin Wright, "The Log Cabin in the South," Unpublished Masters thesis, Louisiana State University, 1950; Charles F. Gritzner, "Spanish Log Construction in New Mexico," Ph.D. dissertation, Louisiana State University, 1969.

Tabby construction has several distinct qualities or characteristics which make it exceptionally well-suited to this type of geographic inquiry. First, the distribution of tabby housing was spatially restricted. Its occurrence was limited to a narrow section of the South Atlantic and Gulf Coasts of the United States. In these locations, tabby competed effectively with other building materials during the eighteenth and nineteenth centuries. Tabby's restricted distribution is a definite advantage in the identification of diffusion hearths of both the material and associated construction methods. An additional benefit of the limited distribution is that it was possible to visit nearly every site that has remaining tabby.

Second, numerous tabby buildings or remnants are available for study. With the exception of those buildings that were deliberately destroyed, such as in St. Augustine, Florida, and Frederica, Georgia, physical evidence may be found of nearly every documented tabby structure which was ever built. These cultural relics attest to the strength and durability of tabby and the relative permanence of the construction material. In contrast to wood and other relatively perishable building materials, tabby was nearly indestructible. Well-made tabby exhibits a remarkable resistance to such destructive elements as fire and decay. For this reason, tabby construction is an ideal subject for field study.

Third, tabby was made from locally derived materials and was not a commercial form of construction. In contrast to some cultural and economic phenomena studied by geographers, the man-land relationships are clearly identifiable. The basic materials of shell, sand, and water were abundant and required almost no monetary outlay, save the labor and euqipment which were invested in securing them.

Fourth, the tradition for tabby construction in the Southeast was fostered by two culture groups: initially the Spanish in St. Augustine and later, the English and Americans along the coast of South Carolina, Georgia, and Florida. The history of tabby's development and distribution is considerably complicated by this dual involvement, but it does afford a unique opportunity to view the trait from a bicultural perspective.

Fifth, though its use in non-folk construction is well-documented, tabby can be viewed as a folk building material. The two statements are not necessarily contradictory. Historically, such non-folk institutions as the military and the plantation have played a very special role in fostering traditional cultural practices. On the subject of the plantation and folk culture, Henry Glassie stated:

> Folk culture is almost obviously fostered by the independent holding where the nuclear family raises, hunts and makes what it needs while maintaining a cash crop only large enough to get them necessities which can not be produced at home...the farm of the owner of several slaves was also basically traditional -- not as a result of the farmer's isolation, ignorance or any lack of capital, but because he controlled so much power that there was little reason for him to adopt labor saving devices.[1]

This was the case with tabby, as the material and building methods exhibit a number of characteristics of folk construction: (1)the component materials were derived from the immediate environment and the labor was supplied locally, (2) all necessary processing and preparation of material was carried on at or near the building site, (3) technical

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[1]Henry Glassie, Pattern in the Material Folk Culture of the Eastern United States. (Philadelphia: University of Pennsylvania Press, 1968), p. 196-97.

skills were traditionally acquired and were not limited to a particular occupational speciality, and (4) no commercial market existed for the material or constructional skills.

Sources of Data

Research data have been acquired from both direct field observation and a variety of documentary materials. Data obtained from documentary sources make possible a far more comprehensive study of tabby than has been accomplished previously. Primary documentation has been derived from archaeological reports, letters, contemporary journal articles, official housing surveys, and other official (archival) documents. Secondary documents have included architectural histories, technical articles on construction and cements, and local and regional historical treatises. From this second class of source materials, only a few works deal directly with the subject of tabby. Particularly notable works in this regard are Mertan Coulter's, Georgia's Disputed Ruins, Albert C. Manucy's "Tapia or Tabby," in the Journal of the Society of Architectural Historians, and A. C. Manucy's, The Houses of St. Augustine: Notes on the Architecture from 1565-1821.[1]

Georgia's Disputed Ruins, edited by Mertan Coulter, contains detailed information on the tabby structures along the Georgia coast. The book's premise is that certain tabby buildings in the state, which were thought to have been of sixteenth century Spanish construction, had been misidentified and were, in reality, tabby of nineteenth century origin. The contents of the work include an essay by Marmaduke Floyd, on tabby construction in Georgia, an archaeological report on the

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[1]Vol. 2 (December 1952): 32-33; St. Augustine Historical Society, 1962.

Elizafield ruins by James Ford, and copies of several nineteenth century documents specifically pertaining to tabby construction.

The Houses of St. Augustine is the most comprehensive of Manucy's two works on tabby and is the only published account that describes tabby construction and its architectural uses during the Spanish occupation of that city. It is a unique and valuable contribution to the literature.

The principal common defect of both Coulter's and Manucy's works is limited context. For example, Manucy has extensive data on tabby in St. Augustine, but scarcely touches upon its other geographic and historic manifestations. Yet he does attempt, on a limited basis, to make general (and often invalid) conclusions about the nature of its construction. The study of tabby as presented has a broader intent. No spatial or temporal limits are superimposed; rather, boundaries are established by the material's own history and geographic distribution.

On site field observations by this writer have been made of over ninety percent of all tabby structures which remain standing or in ruins. The only known sites which were not viewed personally are several structures of rather late construction which are located on relatively inaccesible Sea Islands. No other study of tabby housing has viewed the phenomenon throughout its area of distribution, an oversight which has led to many false conslusions in the extant literature regarding its antiquity, origin, and distribution. These errors may be erased by conclusions already reached through field research and the study presented herein.

Chapter II

THE MATERIAL AND METHODS OF CONSTRUCTION

Nature of Tabby Material

Component Materials

Tabby may be defined as a type of concrete which was prepared by mixing lime, water, sand, and shells in equal (or near equal) proportion.[1] The component materials for tabby were readily available in the coastal zone. Lime was derived from the shells of oysters and other mullusks (conch, clam, and mussel). Methods of lime preparation were apparently simple and required little in the way of equipment. For instance, lime kilns excavated at Jamestown typified the methods used to manufacture lime in the seventeenth and eighteenth centuries.[2]

> The kilns consisted essentially of a chamber having openings at the top and base to ensure both adequate draft for firing and furnishing accessibility for feeding fuel and raw materials, as well as removing the burnt lime.[3]

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[1]This proportioning was by volumetric measure rather than by weight. For example, three bushels of lime and three bushels of water would be mixed with three bushels of shells and three bushels of sand. MS. letter, Thomas Spalding to N.C. Whiting, New Haven, Connecticut, 30 July 1844.

[2]The antecedents of these kilns trace to the flare kilns of England. This simple kiln consisted of a shaft sunk into a hillside and intersected by a horizontal passage at the bottom. Worth Bailey, "Lime Preparation at Jamestown in the Seventeenth Century," William and Mary Quarterly, vol. 18 (1938): p. 3.

[3]Ibid, p. 3.

Remnants of both hillside and free standing kilns were recovered at the site. Bailey identified the latter as the prototype for the common field kiln of the nineteenth century (Fig. 1).[1] Sometimes lime was prepared without the aid of a kiln.[2] At some tabby building sites (e.g., the Gamble Plantation and the Braden Castle, Bradenton, Florida), an open pit, in which the shell was deposited and then burned, seems to have served the same function.[3] Some two to three hundred bushels of shell could be burnt at one time in this manner.[4]

The process of obtaining lime involved the heating of the shell materials to the temperature of decomposition, and the continuance of the temperature for the period necessary to liberate the carbon dioxide from the calcium carbonate and free the atmosphere of the gas.[5] This prevented recombination. The lime was then ready for slaking without sifting or other refining.[6]

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[1]For a detailed description of nineteenth century lime kilns, see Ellis Lazell, Hydrated Lime, 1915 and Charles T. Jackson, Third Annual Report on the Geology of Maine, 1839.

[2]In a recent letter, Albert Manucy, architectural historian, responded to a question on lime kilns in St. Augustine by saying:

> "Sorry, no data on lime kilns in St. Augustine. . . . However, a kiln is not necessary: The Castillo files contain an interfiew I had with an eyewitness to a 19th century limeburning in front of the Castillo. The fuel and shell were layered right out in the open." Albert Manucy, personal letter, 10 November 1974.

[3]Lillie B. McDuffee, The Lures of Manatee (Nashville: Marshall and Bruce Co., 1933) pp. 37, 68.

[4]Earl of Egmont. Manuscript of the Early of Egmont: Diary of Viscount Percival, London: 1922 v. 2, p. 210

[5]$CaCO_3$ (shell) $+\Delta$ = CaO (unslaked or quick lime) + CO_2

[6]CaO (quick lime) + H_2O = $CaOH_2$ (slaked lime); Lime used in the manufacture of tabby apparently did not need to be finely ground. This lime material sometimes is termed kiln run or chunky lime.

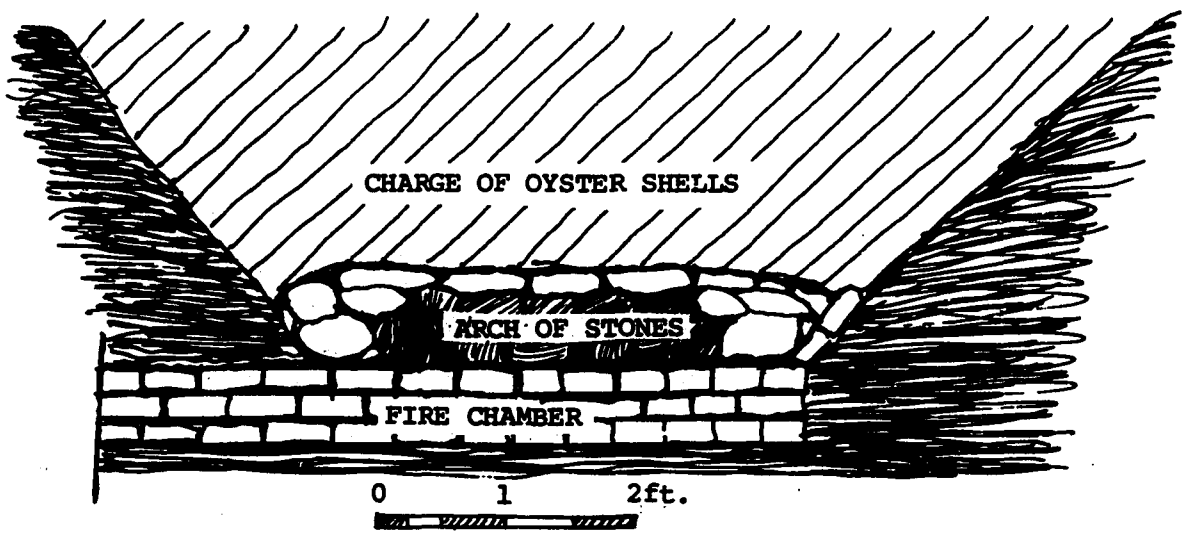

Fig. 1. Diagram of an Eighteenth Century Lime Kiln

Water and sand were also essential to the preparation of tabby. The best tabby was made with fresh water and clean sand (sand free of impurities).[1] Both components appear to have been available at or very near the construction site of every documented tabby structure in the Southeast.

Shells formed the coarse aggregate in the concrete, upon which the lime and sand united and set. Whereas most tabby was mde with oyster shell, the Spanish in St. Augustine sometimes substituted coquina chippings and spalls. In fact, the latter material was favored for certain types of construction (e.g., for floors).[2] Ordinarily, whole shell was used in the construction of tabby walls, while crushed shell (oyster or coquina) was reserved for floor and roof construction and the manufacture of tabby brick.

Oyster shell for lime and the coarse aggregate was procured from either natural deposits or aboriginal shell middens. Both were abundant throughout the area of tabby construction. Middens were the major source, judging from the near complete destruction of many large shell middens in the Sea Island district and the Manatee River region. Only traces remain of the great circular shell enclosures (shell rings) on Sapelo, Creighton, Edisto, and Port Royal Islands. While undoubtedly some shell was used for road building, the bulk of the material probably was employed in local tabby construction.[3] Evidence in support of this

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[1]Spalding to Whiting, 1844; Charles A. Hazen, personal letter, 4 February 1972.

[2]John L. William, The Territory of Florida: Sketches of the topgraphy, civil and natural history (New York, 1837), p. 118.

[3]A. J. Waring and Lewis H. Lawson, "The Shell Ring on Sapelo Island." The Waring Papers (Athens: University of Georgia Press,1965), p.268.

thesis is provided by the area's tabby structures: a considerable amount of cultural debris, such as pieces of bone, charcoal, and pottery sherds is incorporated in the tabby material composing their walls (Fig. 2).

In the absence of nearby middens, or when additional shell was required, drift shell was collected from the shores of tidal estuaries.[1] A major disadvantage of this source was the need to clean the shell prior to its use. This procedure removed salt, an impurity which was potentially destructive to tabby material.[2]

It has been suggested that tabby could be made from rough gravel or crushed stone, as well as from oyster shell. Thomas Spalding claimed the substitution of these materials made little difference in the quality of the product. For example, he reported that he had ". . .built good Tabby from rough gravel taken up from the bed of the Altamaha [river] near Darien [Georgia]" and further stated the "Stone broken up by the sledge hammer, if more easily procured, would answer equally well, [when] used in the same equal proportions."[3] However, Spalding's gravel-made tabby existed in theory only, for in practice shell was the only material used in the making of tabby in the Southeast.

Besides its role as the traditional aggregate, shell, particularly oyster shell, gives certain visual qualities to tabby buildings,

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[1]Live oysters were sometimes gathered along with the dead shells. The tabby in the buildings at Fort Frederica, for example, contains shells of both types.

[2]Salt in concrete made with Portland cement is equally deleterius. Saltwater has been used several times in the construction of seawalls. Each time the concrete structure disintegrated in a relatively short time. C. A. Hazen to J. Gritzner, 4 February 1972.

[3]Spalding to Whiting, 1844.

especially as the walls begin to deteriorate (Figs. 2 and 3). Both the color (cream, beige or pink) and the appearance of whole shell immediately identify the construction material.[1] These characteristics aid in field work, in that they make it quite simple to separate tabby buildings from more recent concrete constructions and that along with massiveness, the exposed shell and light color or structures make them highly visible and distinguishable cultural features (Fig. 4).

I contend that shell is an essential component in tabby. Its use is traditional and the product distinctive. Webster's Third International Dictionary also takes this view, though the Oxford English Dictionary and earlier editions of Webster's have taken more liberal stances and suggest either stone or shell as aggregate material.[2] The limitation of the meaning of tabby serves two useful purposes: it provides a more accurate description of the material, and is a necessary aid in tracing its origin and historic diffusion.

Two aspects of tabby, however, are more critical to its definition than the nature of the aggregate material. These are 1) the equal proportion of component materials and 2) the use of lime mortar as the ginding agent. The former places tabby in the category of concrete, while the latter distinguishes tabby from both Roman and modern varieties.

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[1]The pink color of some tabby buildings is from the growth of a reddish-pink lichen (Chiodecton sanquineum).

[2]"tabby - a cement made of lime, sand or gravel and oyster shells and used chiefly along the coast of Georgia and South Carolina in the 17th and 18th centuries," Webster's Third International Dictionary; "A concrete formed of a mixture of lime with shells, gravel, or stones in equal proportions, which when dry becomes very hard," Oxford English Dictionary.

Fig. 2. Close-up of tabby at Retreat hospital with pottery sherd

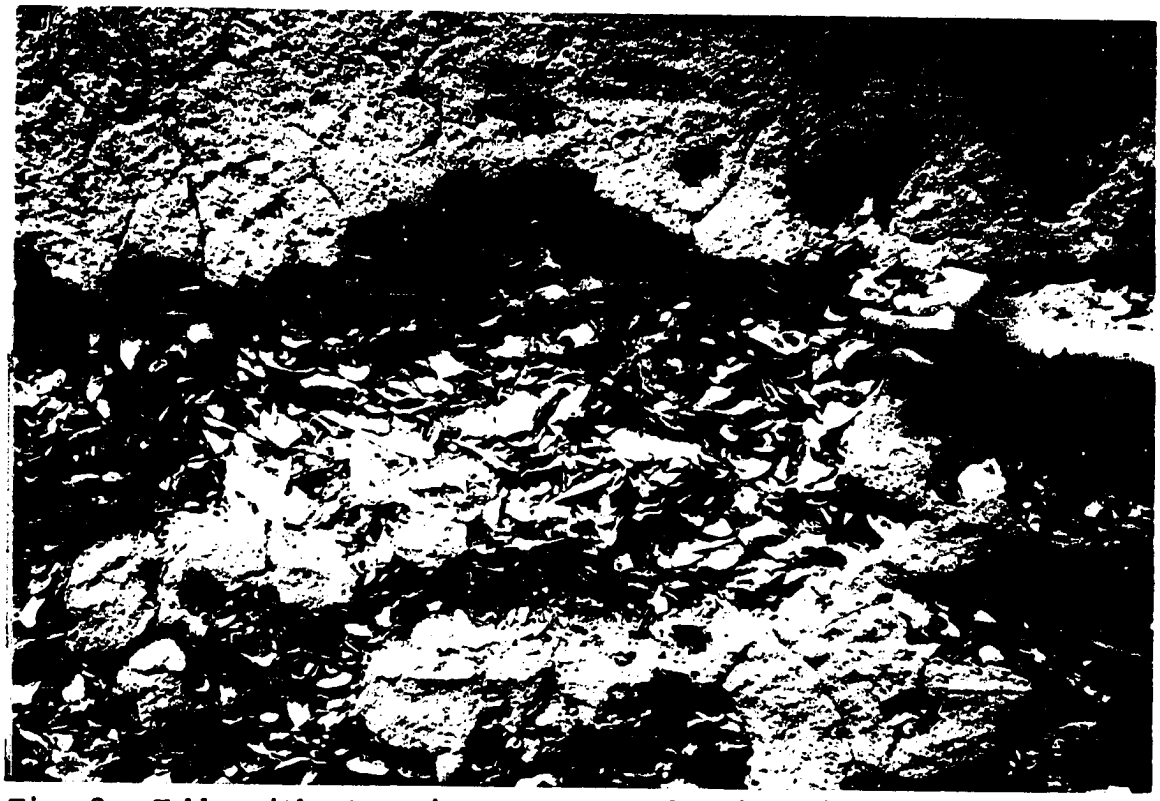

Fig. 3. Tabby with stuccoing at Retreat hospital (St. Simons Island, Georgia)

Fig. 4. South wall of tabby sugar mill, built ca. 1820 (Elizafield Plantation, near Darien, Georgia)

A Comparison of Concrete and the Building Earths

Concrete is a building material which by definition is made by mixing gravel, pebbles, broken stone, fragments of brick or tile, slag, shell or other hard mineral substance, with cementitious materials - cement (or lime), sand and water.[1] When mixed in the proper proportion, the resultant product is a massive material, closely resembling some natural stone in strength and appearance. High grade tabby, for example, is nearly indistinguishable from shellstone (coquina), and one is often mistaken for the other.[2] The stone-like qualities of tabby and other concretes may be attributed to a chemical change in the component materials, as opposed to a physical combination: water, when added to a mechanical mixture of the other ingredients (aggregates, cement or lime, and sand), triggers a chemical change. During the transformation, crystals form causing the cementation of aggregate components and hardening of the tabby or concrete.[3]

Several of the building earths are prepared from materials similar to those used in concrete, but produce in combination a totally

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[1]Architectural Publication Society, The Dictionary of Architecture (London: Whiting and Co., 1892), p. 125; Norman Davey, A History of Building Materials (London: Phoenix House, 1961), p. 122; The size of the aggregates (gravel, pebbles, etc.) would seem to distinguish concrete from mortar. Davey notes, "In modern practice, the aggregates for mortar normally pass through a sieve with 3/16 inch square openings, where as mixtures with aggregate coarser than this would be classed as concrete.", p. 122.

[2]Examples of mistaken identity are common in popular literature. See S.G.W. Benjamin, "The Sea Islands," Harper's New Monthly Magazine 57 (June-Nov., 1878): 844, 848, 854.

[3]Most crystals form in the early stages of hardening (within a week or so); however, some do not, but develop at a later date. The resultant allotropic changes often cause the concrete to crack, but at the same time gives it the curious property of increasing strength with age. Hazen to Gritzner, 4 Feb. 1972.

different product. For example, tapia real, terracrete, and tabia all contain quantities of gravel, earth, and lime. The difference between concrete and the building earth lies in the proportions of component materials and the reliance on mechanical energy as the primary binding force. Both terracrete and tabia refer to forms of rammed earth construction (pise de terre), in which a dry mix of stiff earth (slightly damp, sandy clay soil), gravel and a small amount of lime (or cement) is rammed or tamped between wooden forms.[1] The ramming compels a close contact between soil particles, gravel and lime (or cement), which then adhere by molecular and capillary forces and produce a hard solid mass of material.[2] The lime component both stabilizes and strengthens the material, but because of the limited amount used and the dryness of the mixture, it is not the principal binding agent.[3]

Distinctions Between Tabby and Other Masonry Construction

In addition to tabby, there is a number of other types of concrete including Roman and modern concretes. Though each has more than one distinguishing quality, the main difference among the concretes would

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[1]terracrete: The American term for rammed earth, made with cement (Portland cement) and stabilized clay soil. C. Williams-Ellis and J. and E. Eastwick-Field, Building in Cob, Pise and Stabilized Earth (London: Country Life ltd., 1947), p. 68; tabia: A North African rammed earth of lime and gravel, mixed with a heavy reddish clay. Robert Stuart, A Dictionary of Architecture: Historical, Descriptive, Topographical, Decorative, Theoretical and Mechanical (London: Jones and Co. 1830) 2: See Chapter V for discussion of pise.

[2]C. Williams-Ellis et at., p. 22.

[3]Stabilization is thought of as any process by which earth is made less liable to volume change, more moisture resistant and of greater hardness. C. Williams-Ellis et at., p. 66: See also United Nationa, Department of Social Affairs, House and Town and Country Planning, Bulletin No. 4 (October 1950). p. 59.

seem to be in the selection of cementitious materials. The Roman product was made with lime-pozzolana mortar, which is equivalent to modern concrete with Portland cement or tabby with a lime and sand binder. The mortars used are alike in just three respects: all three concretes are prepared with lime, water, and a certain amount of siliceous material (viz., quartz sand, pozzolana). The binding properties of this combination may be attributed to the formation of two classes of crystals (dicalcium silicate and tricalcium silicate), which appear as the mortars harden. The dissimilarities between mortars are more numerous. For instance, both lime-pozzolana mortar and Portland cement have an alumina component, which interacts with the slaked lime to produce two additional crystals (dicalcium alumina and tricalsium alumina). The result is a product superior to a simple lime-sand mortar. The number of crystals formed and the impurities in the mix not only render hardness and strength to the mortars, but give them and concretes made with them hydraulic properties.[1] Further distinctions may be found in the source of component materials and the preparatory techniques. Only lime-pozzolana mortar, for example, can be classed as a natural cement, for pozzolana (volcanic sand), which gives it both load bearing and hydraulic qualities, is a naturally occurring material, added after the lime was thoroughly slaked. In contrast, Portland cement

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[1]Hydraulic quality of the two mortars refers to their ability to set (harden) under water. Marion E. Blake, Ancient Roman Construction in Italy from the Prehistoric Period to Augustus (Washington, D.C.: Carnegie Institution, 1947) Pub. 570:315.

[2]Turneaure explains the process by which pozzolana and slaked lime interact as "due chiefly to the decomposition of the compounds of lime upon the addition of water, resulting in the formation of calcium hydrate, which on crystallization binds together the other solid ingredients. The initial setting is due principally to the decomposition

is a developed product obtained by finely grinding the clinker which is produced through calcinating to the point of fusion a proportioned amount of argilaceous (clayey) materials with the calcium carbonates (limestone).[1] In terms of the natural origin of materials and manner of preparation, the lime-sand mortar, utilized in tabby, would seem closely related to lime-pozzolana mortar, but unlike the Roman product, it does not contain alumina and is nonhydraulic, which in the view of modern builders qualifies it as a mortar rather than a cement.[2]

Preparation of Tabby Material

Though the specific manner of tabby preparation is not mentioned in documentary sources, it does not deny the existence of an established set of procedures. For example, it is quite likely that nineteenth century tabby was prepared in a manner similar to that later observed for mixing modern cement in the absence of mechanical devices. This mixing procedure, as it would pertain to tabby, may be described in terms of four basic steps.[3]

> Step one: The sand, lime and shell components are collected at the building site, measured and assembled in layer cake fashion on a wooden mixing platform. The materials may be ordered in several ways. A typical arrangement would have been sand at the bottom, an even layering of lime (unslaked) in the middle, and a uniform cover of shell on top (Fig. 5).

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of the alluminates, while the final hardening depends more upon the action of the silicates." F. E. Turneaure, American Civil Engineering, p. 481.

[1] Blake, p. 309.

[2] Ibid.

[3] Hazen to Gritzner, October 1974

Step two: The ingredient materials are cut and mixed, which is accomplished by turning the composite mixture over several times in the same way one prepares a flower bed.

Step three: The entire mixture is shoveled to the center of themixing area and formed in to a hollow cone.

Step four: Water in near equal volume to the other components, is placed in the center pocket. The sides of the cone are pushed together and the product thoroughly mixed. At this point, the tabby is ready for use.

Methods of Building with Tabby

In its long history in the Southeast, tabby was employed for a variety of building purposes. The three principal areas of use were for walls, flooring and roofs. Each entailed distinctive construction techniques.

Wall Construction

Three general methods of building were used in constructing the tabby walls of buildings, yards, and fortifications.[1] In the first method, tabby was placed in a formwork, in the second, combined with wood, and third, made into brick.

Building with a Formwork

Basic to the construction mode was a formwork (or shuttering), consisting of a double parallel row of planks, set up to encompass the entire round of a building or length of a wall. Spreader pins, wooden

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[1]Discussion of a fourth method of wall construction is included in Chapter 111.

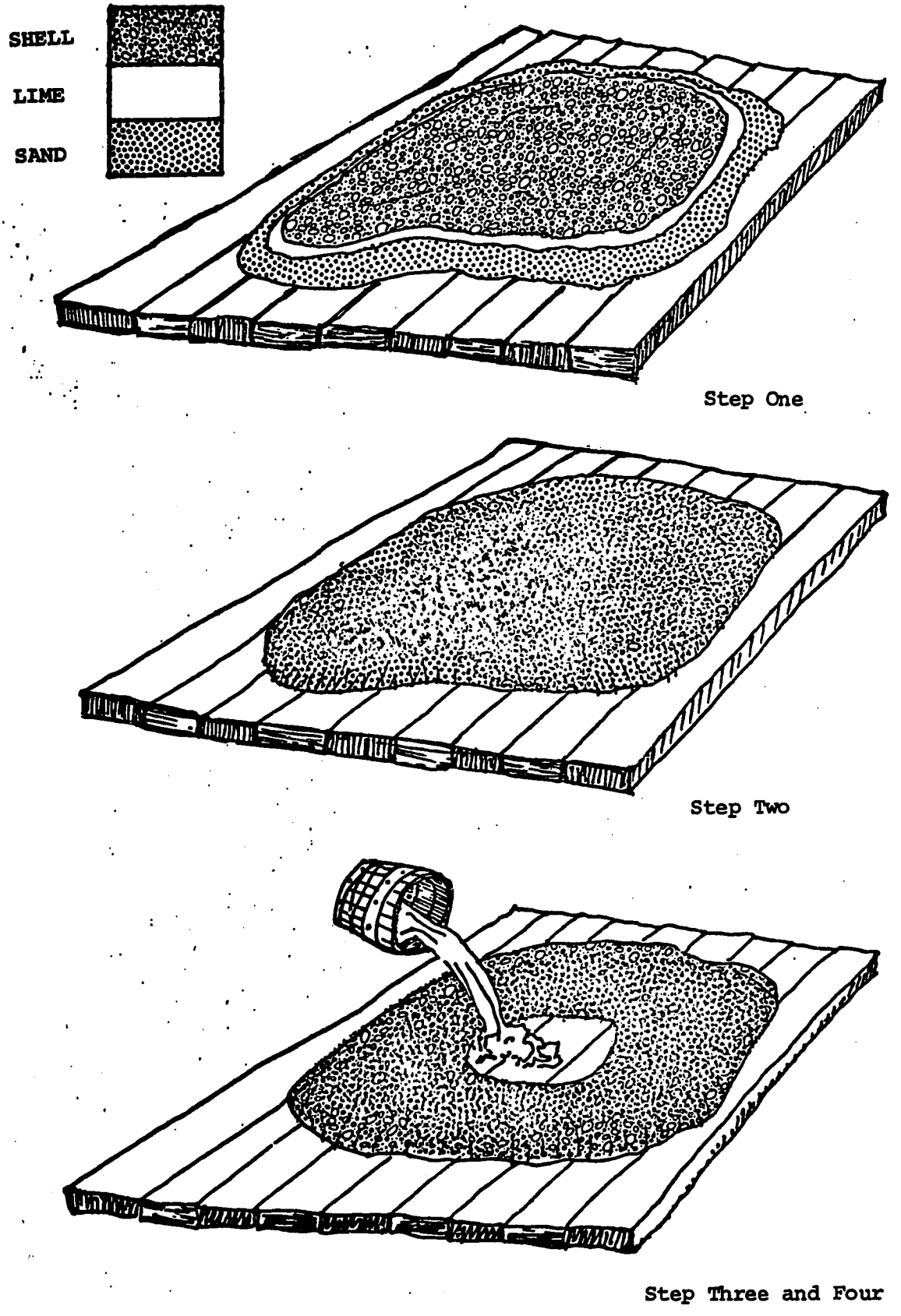

Fig. 5. Four-Step Mixing Procedure for Tabby

plugs or similar wire devices maintained the necessary separation between the planks and gave stability to the formwork (Fig. 6). After the form boards or shuttering were fixed in place, the tabby mixture was added, settled within the formwork, and left to set (harden) for a period of two to three days. The spreader pins were then withdrawn and the planks removed, so that the shuttering might be reassembled for the next level.[1] The same procedure was followed for each successive level until a desired wall height was attained. After the walls were formed, the building or enclosure usually was given a protecitve coating of stucco, and if constructed for housing, a roof was added.

Spanish formwork tradition

This fashion of building characterized both Spanish and English-American tabby traditions. The English-American usage is considerably better documented than the Spanish, for the latter is known primarily from a few archaeological excavations in St. Augustine and from such references as "casas de ripio," "casas de ostion," in the Elixio and Rocque housing surveys of 1764 and 1788.[2] For this reason, Spanish building procedures may only be speculated; it is assumed that they

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[1]It is likely that the inside of the forms and the spreader pins were greased prior to use. This practice, which is common in modern concrete construction, would have prevented the absorption of water, kept the forms in shape when not in use and most important assisted in their removal. Frank D. Graham and Thomas J. Emery, Audels Carpenters and Builders Guide No. 3 (New York: Theo. Audel and Co., 1923), p. 864-2.

[2]Juan Joseph de Elixio de la Puente, MS. key to map entitled "Plano de la Real Fuerza, Baluarte y Kinea de la Plaza de Sn Agustin de Florida . . ." 22 January 1764; Mariano de la Rocque, "Plano Particular de la Ciudad de Sn. Agustin de la Florida" At. Augustine, 1788.

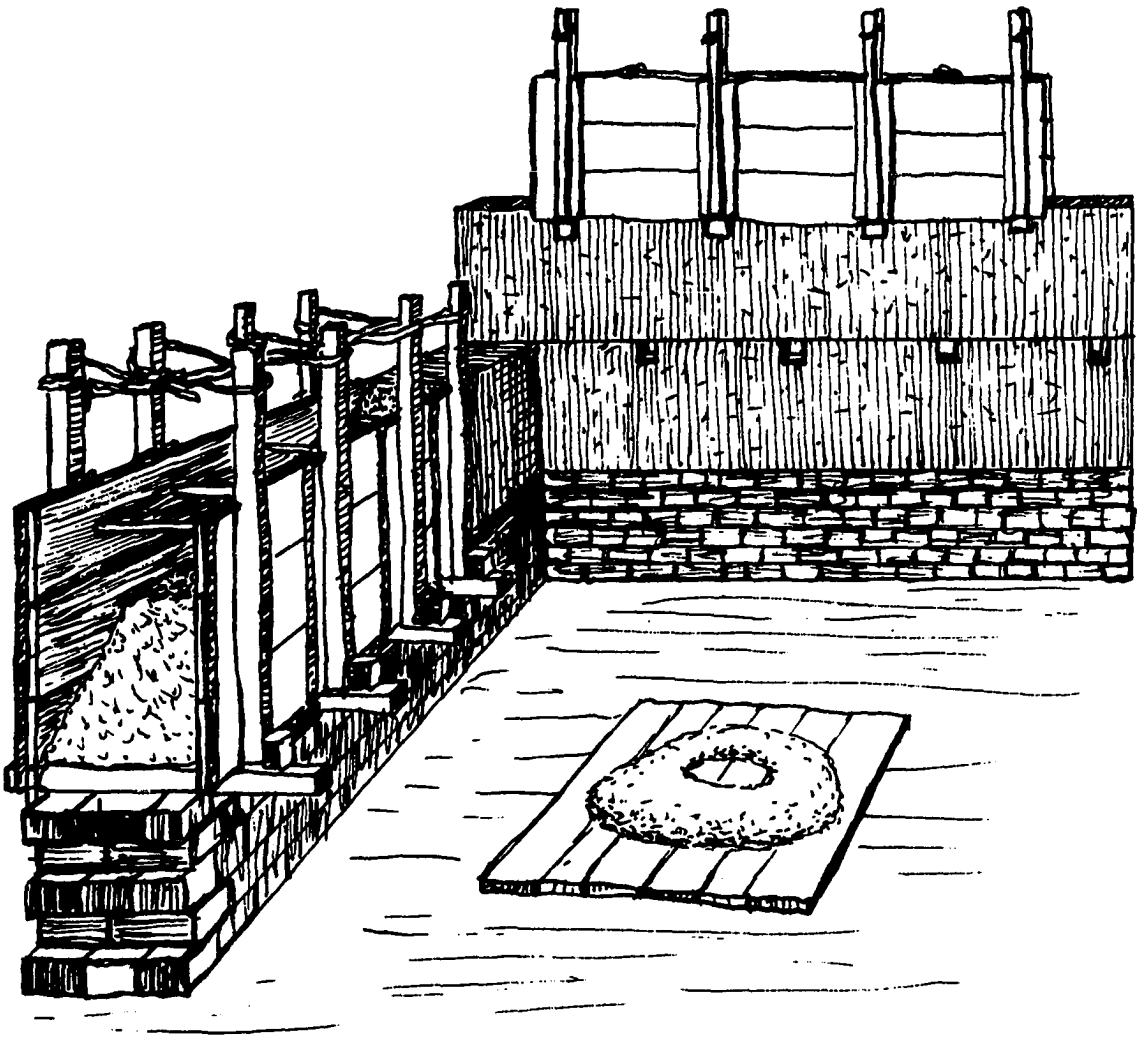

Fig. 6. Diagram of a Formwork

largely paralleled the English methods of the same period.[1] Certain differences did exist, however, in regard to the structural features of tabby buildings. Notable characteristics of Spanish formwork construction were the preference for single story structures and the narrower width of the exterior walls. According to Spanish records, eleven-inches of tercia (a third of a vara) was the standard wall thickness for one-story masonry structures (tabby and coquina). The thinner nine-inch tabby walls probably corresponded to what Rocque called tablique de ostion (partition or thin wall of tabby), which served as an interior or particion wall in a few stone (coquina) and tabby houses.[2]

English-American formwork tradition

The best information on English-American procedures comes from the letters and published works of Thomas Spalding, a Georgia planter of the later antebellum period. In his writings, Spalding detailed the method of constructing tabby buildings which he developed. It became the most common technique employed in nineteenth century tabby construction.[3] James Ford and Marmaduke Floyd refer to this set of procedures as the "Spalding Method," which may be distinquished from the so called

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[1]See discussion on Oglethorpe method on page 13.

[2]Ynventarios Tasaciones, y venta en publico Remate de las Casas Y Solares del Rey," St. Augustine, 19 August 1790.

[3]Not all nineteenth century tabby construction utilized the type of formwork described in Spalding's writings. In the construction of tabby buildings at the Kingsley Plantation on Fort George Island, Florida and possibly those at St. Mary's, Georgia and Bradenton, Florida, wooden or metal boxes with handles, that varied from twelve to thirty-sic inches in height, were devised to take the place of forms which had to be dismantled and reassembled for each level. The twenty-four tabby slave houses at the Kingsley Plantation represented a massive construction effort which attests to the apparent success of this innovation. 'Notes compiled by Elanor Philips, 1953,' "File on Architecture (including tabby)," St. Augustine Historical Society Library.

"Oglethorpe Method" of the eighteenth century.[1] The Spalding Method is aptly described in the following exerpt.

> Two planks as long as convenient to handle, 2 inches thick and 12 inches wide, are made to unite and to go the round of your building. These planks are kept apart by wooden spreader pins with a double head as thus the first head keeps the outer plank in its place, the last with the pin run through the point, keeps the inner plank firm while the workmen are filling in the material and setting it down, either with a spade or light rammer, which, if shells, brings these into a flat position. Then, the planks at the ends are let into each other thus:
>
> 
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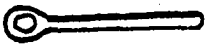
> h an iron wire 
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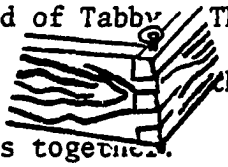
> with an eye to draw it out at each round of Tabby. The corners of the building are thus:  the same kind of iron wire binding the sides together.
>
> All that is necessary when you construct doors or windows, is to drop a short board across the wall between the outer and inner planks and steady it with two poles, to be drawn out at each round and replaced at the next, and so continue until you reached the height you intend your doors and windows.[2]

Structures, built according to these instructions, possessed certain distinct features, which included: 1) tiers of tabby that were all the same width and which ran the entire round of the building; 2) twelve-inch lift heights for each tabby tier; 3) tie holes that lined up directly with those below and above, and 4) an absence of cast marks, which indicated the junction of the planks (Figs. 7, 8, and 9).[3]

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[1] E. Merton Coulter, ed., Georgia's Disputed Ruins (Chapel Hill: University of North Carolina Press, 1937), pp. 81, 199.

[2] Spalding to Whiting, 1844. The spreader pins were placed approximately two inches above the junction lines of the tabby layers at intervals of three feet eight inches to four feet ten inches. James Ford, "An Archaeological Report on the Elizafield Ruins," Georgia Disputed Ruins, p. 217.

[3] Field observations confirm Ford's enumeration of features. Ibid, p. 199.

Fig. 7. Alinement of tie holes typical of the Spalding method

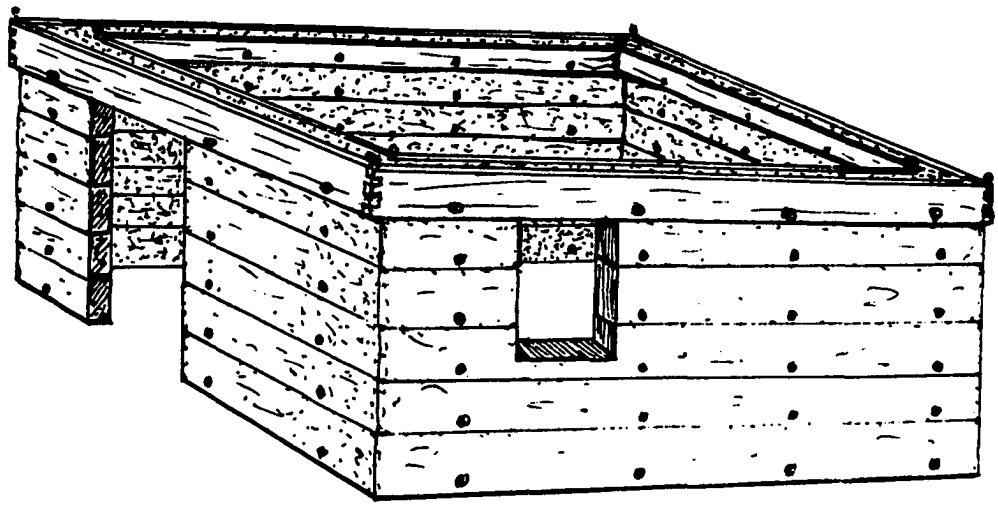

Fig. 8. Sketch of Tabby Building in the Final Stage of Construction (after Spalding, 1844)

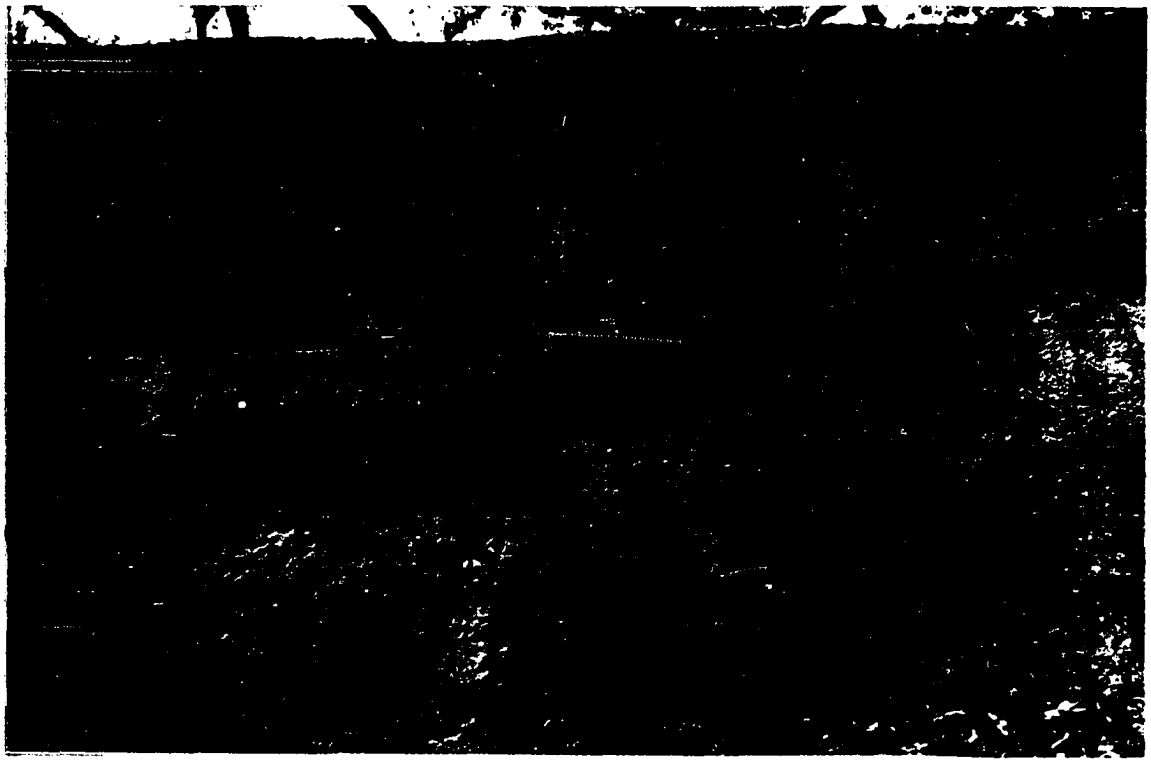

Fig. 9. Stucco with ashlar markings at Retreat hospital (St. Simons Island, Georgia)

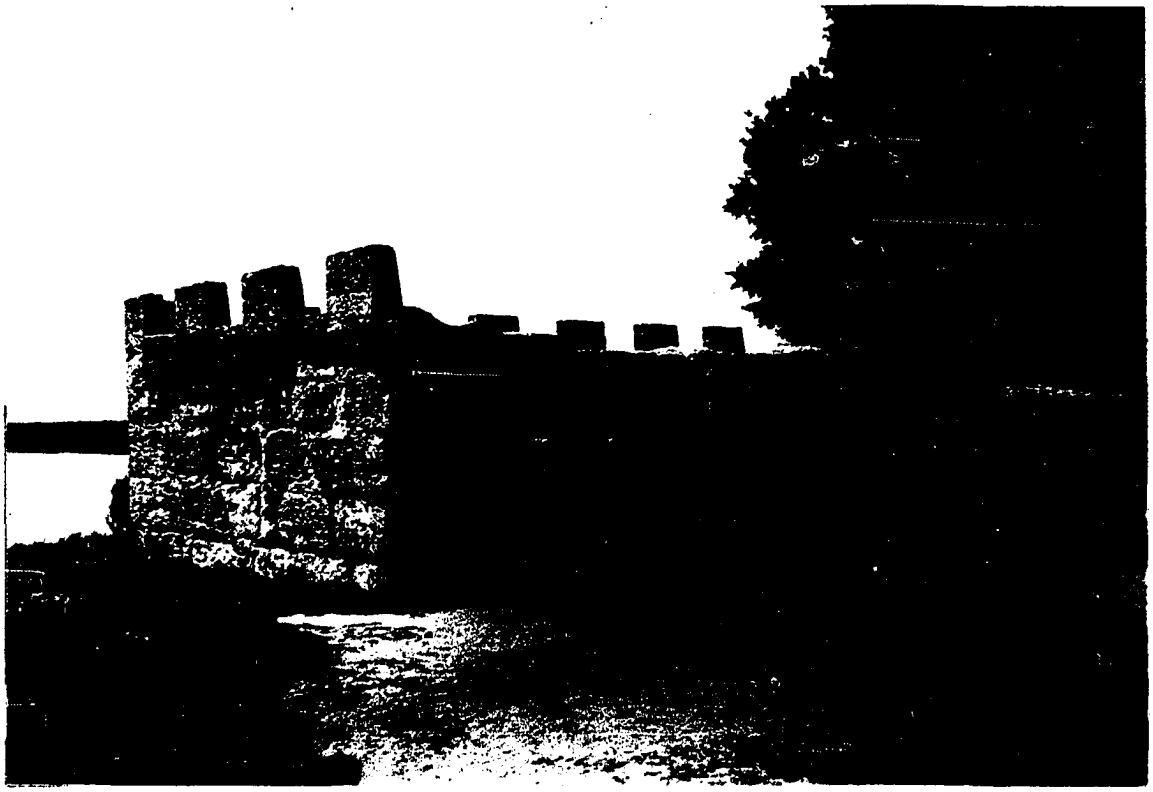

Fig. 10. King's magazine, built ca. 1740-41, at Fort Frederica (St. Simons Island, Georgia)

The Oglethrope Method is well illustrated by the tabby remains of eighteenth century Fort Frederica and Fort Wymberly on St. Simons Island and Isle of Hope, Georgia. It displayed a different set of characteristics which include: 1) uneven tabby rounds of unequal width; 2) tabby lift heights of twenty-two or more inches; 3) large circular shaped and irregularly spaced tie holes, and 4) obvious cast marks with distinct jogs, that showed the forms were not secured at the ends.[1] (Fig. 10). In comparing the resultant products, the eighteenth century, or Oglethorpe Method, clearly emerges as the cruder of the two patterns. The procedures of eighteenth century construction were likely those described by John Bartram for the tabby buildings in St. Augustine. He visited the city in 1766, during its occupation by the British. At that time, the Spanish had completely vacated East Florida. Thus, Bartram's account of the building method came from either English informants in St. Augustine, or his own observations elsewhere. This method was described as follows:

> But most of the common Spanish houses was [sic] built of oyster shells and mortar, as well as garden and yard walls. They raised them by setting two boards on edge as wide as they intend the wall, then poured in lime-shell mortar mixed with sand, in which they pounded oyster shell as close as possible. And when that part was set, they raised the planks and so on till they had raised the wall as high as wanted.[2]

The strength and durability of tabby walling was closely related to the building procedures, a factor that accounts for the qualitative differences between eighteenth and nineteenth century tabby structures.

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[1] Ibid.

[2] John Bartram, Diary of a Journey Through the Carolinas, Georgia, and Florida from July 1, 1975 to April 10, 1766 (Philadelphia, 1942) (Francis Harper, ed.), p. 55.

For example, the rapid deterioration of the eighteenth century fortifications at Port Royal, South Carolina and on St. Simons Island, Georgia, both within fifteen years of their construction, might be attributed to two conditions: 1) the height of the rounds or tiers of tabby; and 2) the rapidity of the construction. The tabby courses (rounds) at Forts Frederick and Frederica were set in thirty-inch and twenty-two inch lift heights, respectively. Walls, built with such lift heights, took a long time to set and had few joints along which expansion might take place. High quality tabby, like modern concrete, had to be poured slowly, given sufficient time to harden and for the heat of hydration of one layer to dissipate before another was added. Too rapid construction and insufficient number of expansion joints meant cracking and crumbling in the tabby, which weakened the structure and hastened the deterioration.[1] Both problems existed to some extent in all eighteenth century construction. The imporvements of the nineteenth century, evidenced in the number of well preserved structures from this period, lie in the refinement of building techniques. For example, the reduction in the height of tabby courses from twenty-two to twelve inch increments counteracted the problem of cracking. The narrower courses imbued walls with ample jointing for expansion and allowed them to harden more rapidly.

Variation in form and function characterized the English-American built structures from both the eighteenth and nineteenth centuries. Wall height, length, width, thickness, the number of stories, and other discrete features would seem to have been established by the specific requirements of the building. For instance, the thickness or

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[1]Hazen to Gritzner, 4 February 1972.

width of tabby wall, an especially variable feature, has been observed to range from some ten to sixty inches, depending on the type of structure. The walls of tabby forts ranged in measurement from twenty-two to sixty inches, whereas the walls of houses generally varied from twenty-four inches as an average foundation width, to fourteen or fifteen inches for the first story, and ten to twelve inches for the second.[1]

For structural reasons and perhaps cultural preference, tabby buildings rarely exceeded two stories in height. Most were single story structures, which included a good portion of the more modest tabby dwellings and nearly all non-residential construction. Except for Dungeness, a three-story residence on the south end of Cumberland Island, Georgia, large tabby plantation houses were all two-story and representative of architectural styles popularly favored by Southern planters of the eighteenth and nineteenth centuries.

Post-and-Tabby: a composite construction

Described in modern terms as composite construction, "post-and-tabby" (Spanish: ostion y postes) incorporated both tabby and wood materials and could be distinguished by its combination of vertically set wooden posts and masonry curtain walls.[2] From "post-and-tabby" remnants recovered at two archaeological sites in St. Augustine, Florida, and several on St. Simons Island, Georgia, two possible methods of construction have been hypothesized.[3] The first has been suggested

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[1]Spalding to Whiting, 1844.

[2]Rocque, Entry no. 129.

[3]Hale G. Smith, "Final Field Report of the Archaeological Investigations of the Arrivas House," Mimeograph, 1960; Robert H. Steinbach, "Interim Research Report Block 38 Lot 6," 6 August 1969; Charles F. Fairbanks, "The Excavation of the Hawkins-Davison Houses,

by Albert Manucy and the second by Robert Steinbach. Manucy regards "post-and-tabby" as an elaboration of formwork construction, in which vertical wooden posts were imbedded in the tabby wall at five foot intervals during the pouring (Fig. 11). He notes that posts, inserted in such a manner, would serve to both strengthen and hasten the construction of tabby buildings, for they "not only stiffened the wall, but carried the weight of the roof, thus relieving the new [slow setting] tabby of premature strain."[1] Steinbach's views differ from those of Manucy. He interprets "post-and tabby" to be essentially post and beam structures with masonry curtain walls (Fig. 12). Steinbach states: " The only framing evidence on the exterior would have been the corner posts, as the intermediate posts would have had a 3" covering of tabby"[2] Regarding the construction method Steinbach concludes: "The foundation and posts were placed concurrently and the masonry wall then raised between (italics mine) the posts."[3]

The manufacture of tabby brick

English-American tabby usage also included the manufacture of brick. Samples have been found at former plantation sites in Georgia

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Frederica National Monument, St. Simons Island, Georgia" The Georgia Historical Quarterly vol. 40 (1956), pp. 217, 219; Albert C. Manucy, The Fort at Frederica, Notes in Anthropology, vol. 5 (Tallahassee; The Department of Anthropology, Florida State University, 1962), pp. 57-58.

[1]Albert C. Manucy, The Houses of St. Augustin, 1565-1821:Notes on the Architecture from 1565 to 1821. Teh St. Augustine Historical Society. (Jacksonville, Florida: Convention Press, 1962), p. 69.

[2]Robert H. Steinbach to Janet H. Gritzner, 3 December 1974.

[3]Ibid.

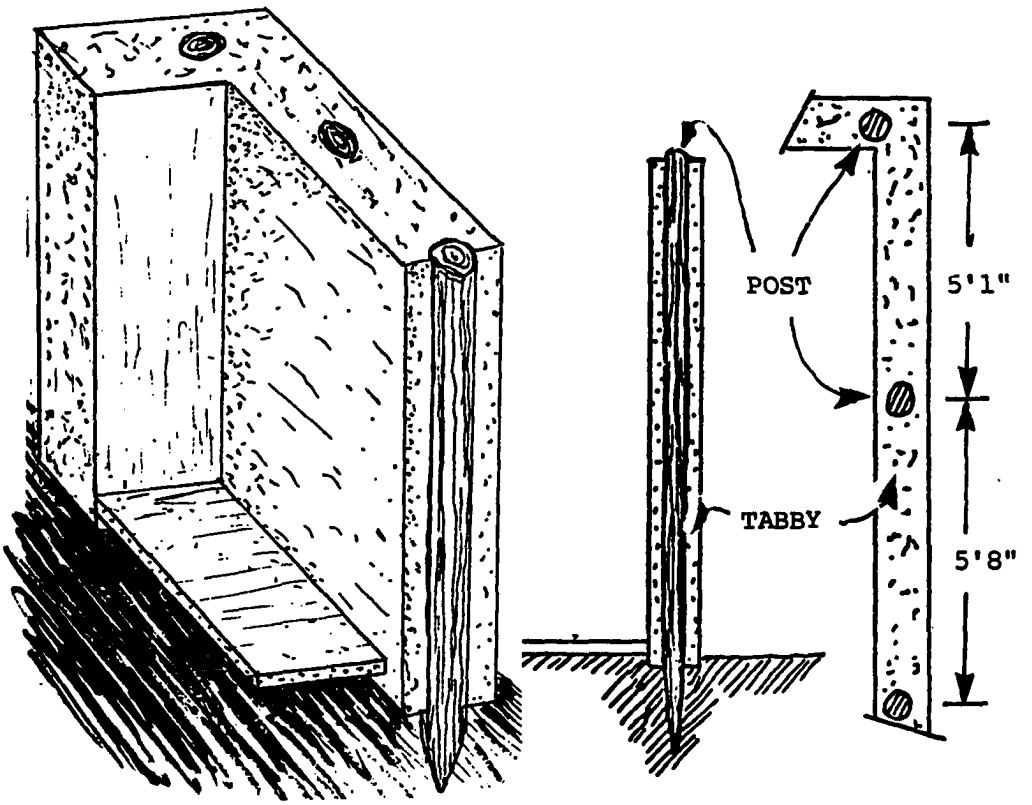

Fig. 11. Post-and-Tabby Construction According to Manucy

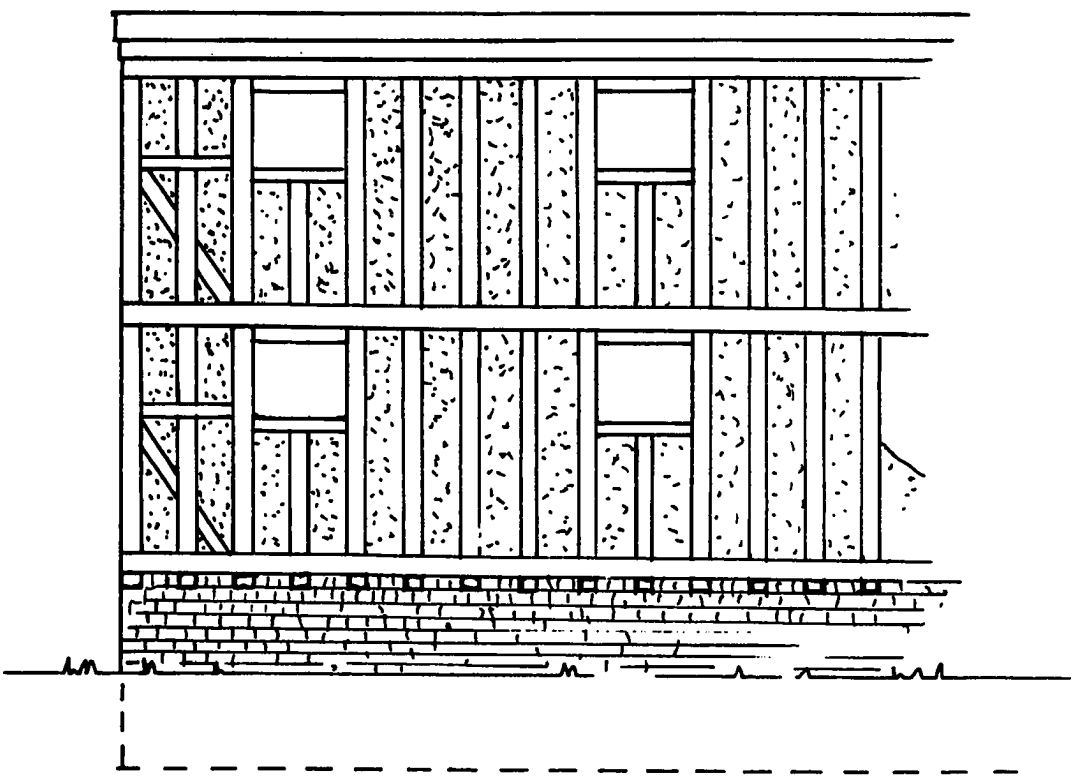

Fig. 12. Ostion y Postes Construction according to Steinbach

and on the Atlantic and Gulf coasts of Florida, where brick was used for a variety of building purposes (such as in foundations, chimney bases, burial vaults, supporting and decorative pillars, walls enclosing cemetery plots, cooking pits, and the walls of plantation houses and outbuildings). Tabby brick, made in both the eighteenth and nineteenth centuries, can be distinguished from other bricks by its material, method of manufacture, size, color, and durability. Like adobe and modern concrete brick, it belongs to the class of unburnt brick. Kiln firing was not part of the production process. Tabby brick acquired its hardness through the binding properties of the lime-sand mortar. Modern builders designated brick of this type "mortar brick." In terms of its manufacture, a relatively simple three-step procedure might be envisoned.

Step one entailed the preparation of the tabby mixture. During this operation, the component materials (i.e., lime, sand, water, and crushed shell) were collected and mixed proportionately. In steps two and three, the semi-fluid material was poured into the brick mould and left to harden for a period of from six to eighteen months. When this procedure was adhered to, a high quality product resulted; one which has been shown to be remarkably durable, even after 175 years (Fig. 13). As regards color, shape, and size, tabby bricks were light grey or beige, with but few exceptions rectangular, and generally larger than the 2 1/4-by-3 3/4-by-8 inch standard modern American-made brick. The brickmakers' preference and the particular requirements of the construction dictated the size and shape of tabby bricks. At the Braden Castle and the former Gamble Plantation in Bradenton, Florida, three sizes of rectangular brick at the former site and 2 1/4-by-3 1/2-by-

Fig. 13. Brick-built outdoor cooking pits (Gamble Mansion, Ellenton, Florida)

9 1/4 inch brick at the latter. Shape was also a variable attribute. The main house at the Gamble Plantation exhibits two brick forms: rectangular tabby brick in the walls of the mansion and wedge-shaped brick in the cylindrical pillars (Figs. 14 and 15).

Construction of Tabby Floors

The Spanish tabby tradition differed from the English tradition in two important respects: 1) their extensive use of tabby for floor construction and 2) the use of the material for roofing (Fig. 16). These uses received little documentation in Spanish records. Most of the technical and descriptive information has been derived from archeological data and eighteenth century English narratives. Archaeologists, working in St. Augustine, have recovered sections of tabby pavement and floor fragments from the Castillo de San Marcos and the sites of a number of eighteenth century Spanish residences. Often an excavation of a housing site revealed a whole series of tabby floors. Five separate floors were reported by Smith for the Arrivas House and four, varying from .07 to 3 inches in thickness, for St. Augustine's "oldest house."[1] One may conclude, that tabby floors had short life spans.[2] After a generation or so, they became rough and pitted and had to be replaced. New floors merely were superimposed upon the old worn ones.

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[1]Smith, "Final Field Report on the Arrivas House"; Hale G. Smith, "Archaeological Excavations at the Oldest House, 1958," Evolution of the Oldest House, Notes in Anthropology, vol. 7 (Tallahassee: Florida State University, 1962), pp. 81-84, 90.

[2]Tabby floors had not the strength and durability, that one might expect. Even the four-inch thick flooring at the Castillo, several inches thicker than the average floor, had a relatively low compressive strength. The U.S. Bureau of Standards rated it at 420 pounds per square inch. Albert C. Manucy, "Tapia or Tabby," Journal of the Society of Architectural Historians (1952) 11: 33.

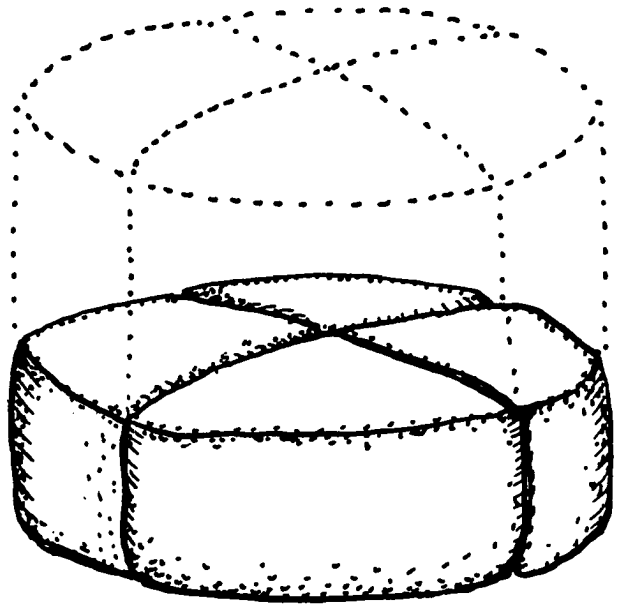

Fig. 14. Diagram of Pillar Construction, Gamble Mansion, Ellenton, Fla.

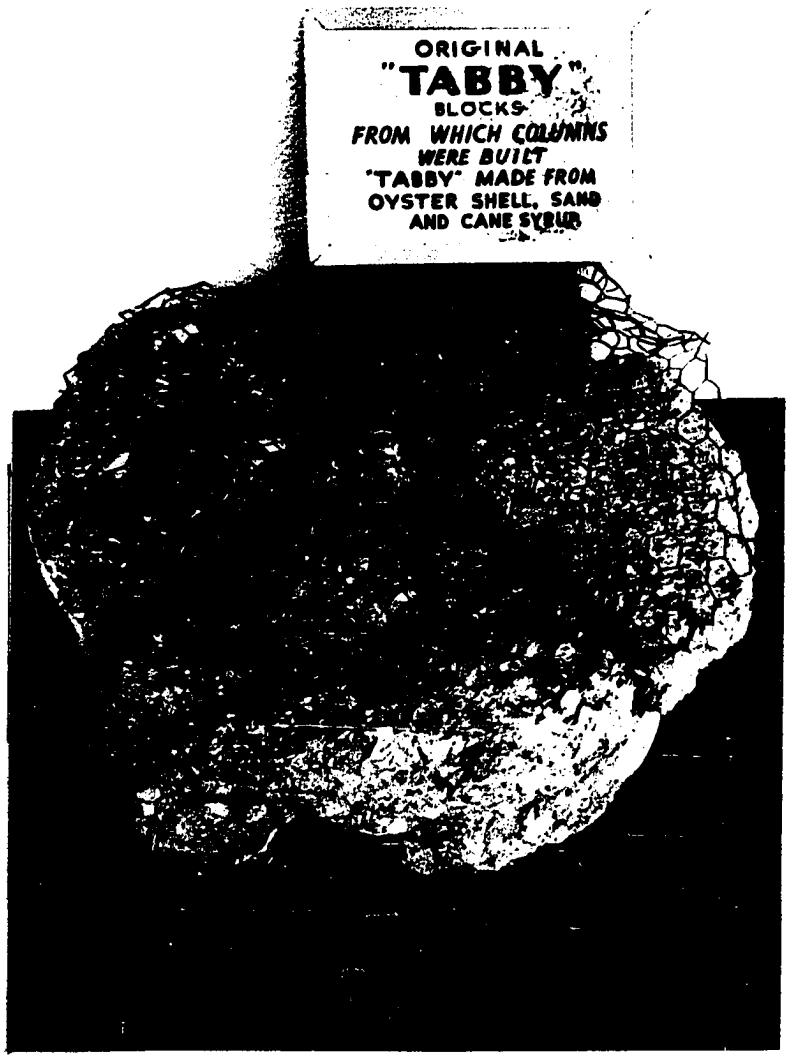

Fig. 15. Wedge-shaped tabby brick in pillar remnant at Gamble Mansion (Ellenton, Florida)

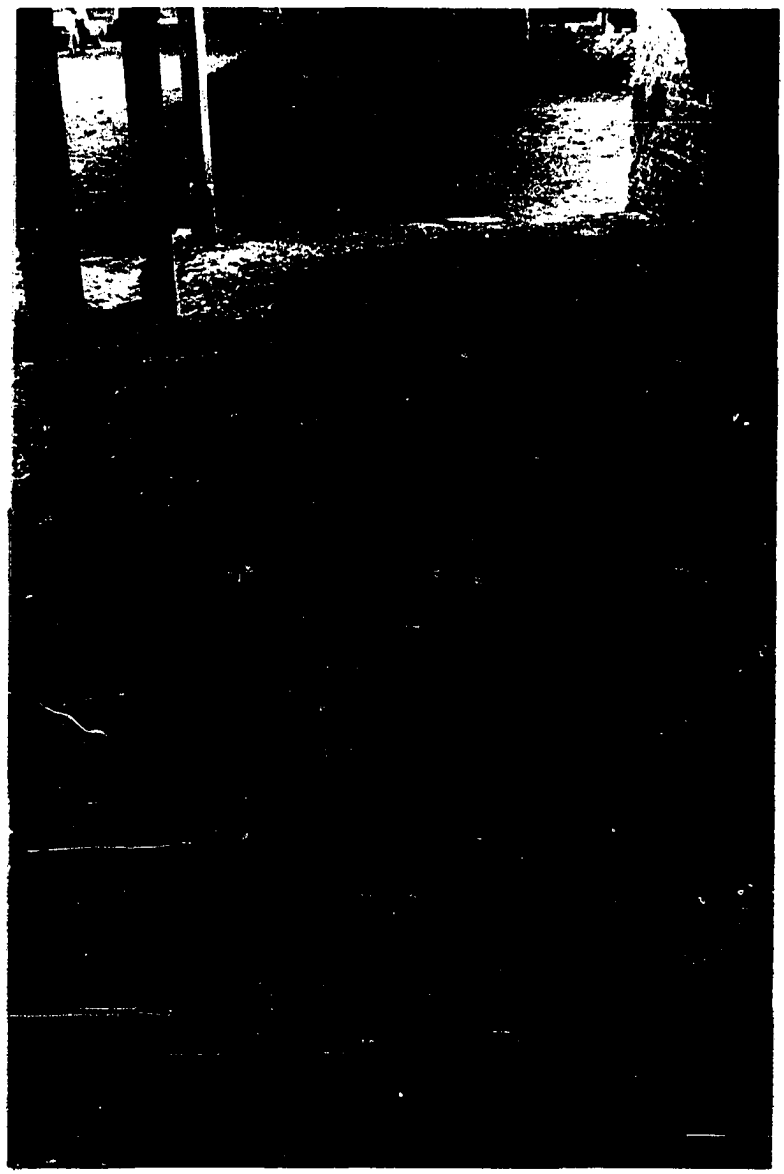

Fig. 16. Tabby flooring at the Kingsley Plantation (Fort George Island, Florida)

Albert Manucy has identified two different techniques of floor construction.[1] The more common of the two procedures is described in William Gerald DeBrahm's "History of the Three Provinces." This account, written about 1770, is as follows:

> I advise to burn Shells into Lime and to mix it with twice the quantity of unburnt pounded Shells; these Materials together to be made up into Mortar, soon petrifying . . . . After the ground Floor of the House is well rammed with heavy Pestles; the above Mortar is to be laid on four or six inches thick, and beat by three or more Persons with light Pestles all over, gently and quickly until nothing of the Mortar will stick to the Pestles, then a brush of lint-seed-Oil must be given all over and continue beating until the oil disappears. This brushing with Oil and beating is to be repeated until the Floor is hard, smooth and shiny; such a Floor will prove near equal to Marble, cold, easy to be cleaned with a Wet Mop, and aired to Keep out Jiggers, beside all manner of Bugs and Vermin.[2]

Floor fragments, taken from St. Augustine's oldest house and the Castillo de San Marcos, generally bear out DeBrahm's description of the construction procedure. Some samples from the Castillo even provide evidence of a linseed oil finish. Manucy observed: "Continuous beating brought a concentration of lime to the surface and the oil sealer helped to form a hard, cream colored crust." The resultant finish, he noted, compared favorably with that of modern steel floated cement (terrazzo).[3]

Despite DeBrahm's pronouncement, not all tabby floors were built on tamped earth foundations. Sometimes the original floor at a site overlaid a packed base of oyster shell or coquina chippings. The

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[1]Ibid.

[2]William Gerald DeBrahm, "History of Three provinces," Harvard College, MS., 1751-1771, p. 302 quoted in Manucy, "Tapia and Tabby," Floors 4 to 6 inches thick required three days in good weather to harden.

[3]Manucy, "Tapia or Tabby," p. 33.

thickness of the base material and that of the overlying floor slab varied with the intended purpose of the construction. At the Castillo, where a strong, thick floor was required, two or three two-inch pours were made, one on top of the other, over a three-to-four-inch shell base. In residential construciton, floors were usually thinner (less than three inches thick), formed from a single slab and laid over a one-to-two inch base of oyster shell.[1]

The second construction technique used in St. Augustine produced a softer and possibly lower grade of tabby flooring. Boards or a bed of coquina rubble was first laid as a subgrade. A weak mix of lime, loose coquina shell, and coquina spalls was then poured over the base. The tamping that followed produced a level surface and hard crust, but one that broke easily under concentrated weight.[2]

Construction of Tabby Roofs

The principal tabby roof style in Spanish building was the azotea (flat rood), sometimes referred to as techada de tabia (board roof), which was composed of a thin tabby slab formed over a deck of boards.[3] Spanish records from the Castillo de San Marcos supply the only available construction details. One account, written in 1686, indicates a flat masonry roof on the quarters built around the courtyard of the fort: "The 19-foot span between the parapets was bridged by

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[1]Manucy, Houses of St. Augustine, p. 118.

[2]Manucy, "Tapia or Tabby," p. 33

[3]Juan Joseph Solana, "Report on the Condition of St. Augustine, St. Augustine, 22 April 1759." Cited in Manucy, Houses of St. Augustine, p. 105.

beams (vigas) 11 inches high and 16 wide. Random width pine plank 4 fingers [2 3/4 inches] thick was laid over the beams, and topped by a pour of masonry (argamasa)."[1] Presumably the same method was employed to construct the flat roofs on many of the stone (coquina) houses in St. Augustine's private sector.[2]

A roof remnant at the Castillo de San Marcos provides evidence of a second, somewhat different, tabby flat roof. Formed over one of the vault-like rooms of the Spanish fort, the roof is ten to twenty inches thick and made up of three separate layers of tabby. The layers vary in thickness to compensate for the room's arched ceiling. The lowest one, established as the subgrade, ranges from two inches thick at the soffit up to twelve inches thick over the fill in the spandrels, the middle one averages three inches, and the top almost five inches.[3]

English-American builders never adopted the techniques of tabby flat roof construction, but on at least one occasion constructed a pitched roof of the material. A tabby gabled roof may be observed on the nineteenth century all-tabby smokehouse (Fig. 17). Exhibiting similar tabby layering as that of the walls, it is clear that wall building procedures (including the use of a movable formwork) were applied to its consturction. Such a roof must have been difficult to construct and owing to its massiveness, hardly practical for larger tabby build-

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[1]"Discrezion de la Planta del Castillo . . ." MS. tracing of plan key. St. Augustine, 1686. Translation in Manucy, Houses of St. Augustine, p. 105

[2]In 1759, Father Solana reported 23 of 303 houses in St. Augustine were piedras y sotea: squared masonry and flat roofs. No tabby or wood houses with flat roofs were indicated for this, or any other period. "Report on the Condition of St. Augustine."

[3]Manucy, "Tapia or Tabby," p. 33

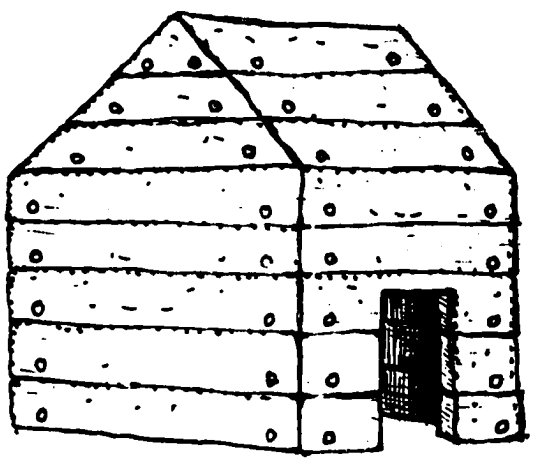

Fig. 17. Sketch of Pitched Roofed Tabby Smokehouse, Datha Island Plantation, Datha Island, S.C.

Thus, pitched roofs on tabby structures usually were constructed of wood, even to the gable ends. Indeed, gabled roofs of wood shakes or clapboard constituted the most common form of roofing for English-American tabby buildings.

Chapter III

HISTORICAL DISTRIBUTION

The spatial distribution of tabby was limited to a narrow section of the South Carolina, Georgia, and north Florida coasts. Examples of the material, most of which date from the eighteenth or nineteenth century, have been found on nearly all the Sea Islands and adjacent mainland areas from Charleston, South Carolinas, to St. Augustine, Florida, and in the Manatee River section of Florida's Gulf Coast (see map 1).

This distribution reflects diffusion from two primary centers or hearths: one at St. Augustine, Florida, and the other at Beaufort, South Carolina. These centers represented the core areas for two separate traditions in tabby building.

St. Augustine and the Spanish Tradition

The First Spanish Period in Florida - Early Phase (1580-1701)

The antiquity of tabby in Spanish Florida is documented through Spanish records and archaeological evidence. The earliest references to tabby-like material are found in letters to the Spanish crown dated 1580, which described its use in roof slabs at St. Augustine[1] and Santa

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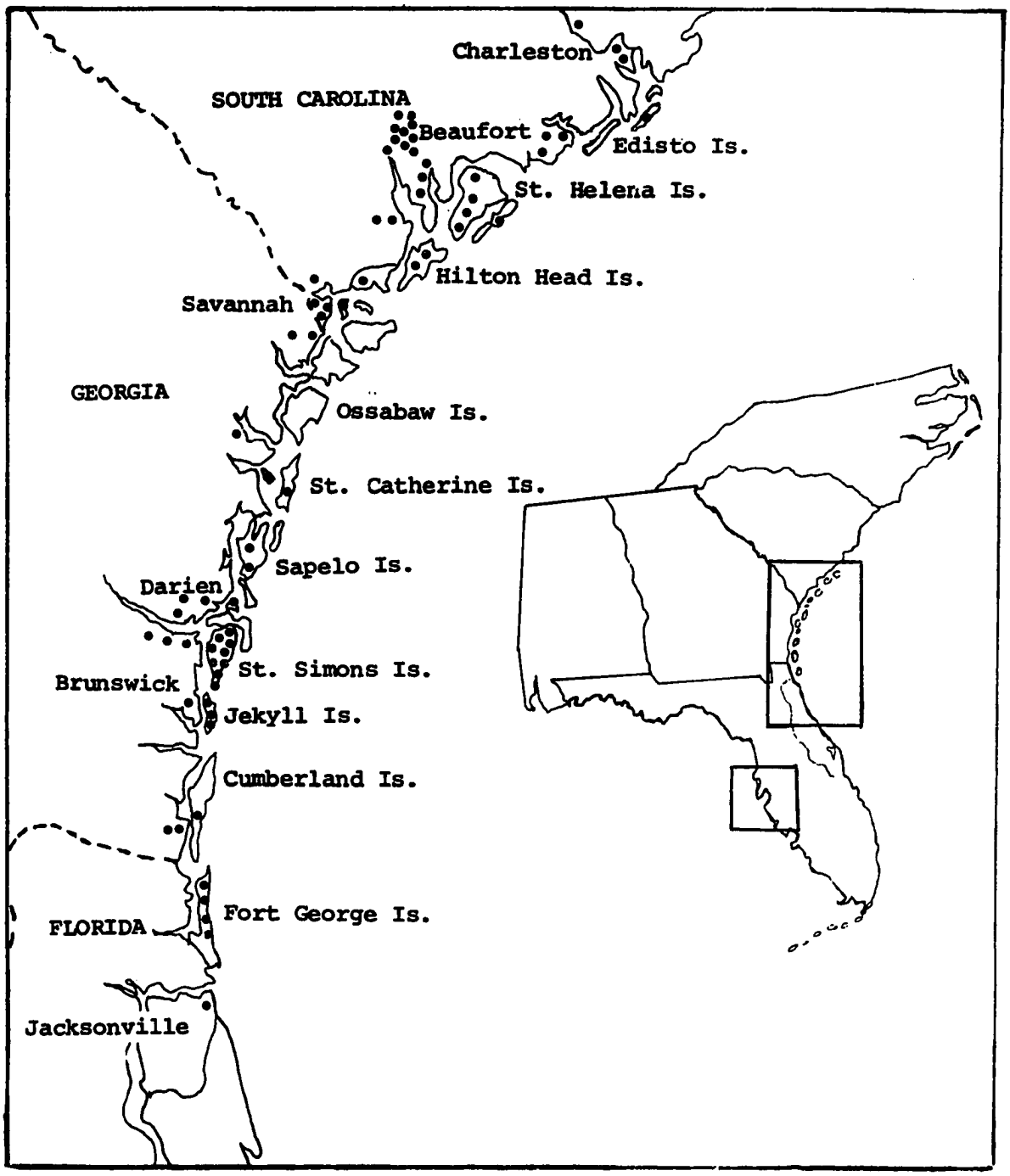
[1]Lorenzo Sanchez de Mercado, "Letter to the Crown, St. Augustine March 1580," quoted in L. A. Vigneras, "Fortification de la Florida," Anuario de Estudios Americanos, 16:540.



Map 1. Extant Tabby Buildings and Remnants along the Southeastern Coast

Elena (Port Royal Island, South Carolina).[1] Evidence of seventeenth century tabby has been derived from archaeological excavations. Such data establish tabby floor construction in St. Augustine by 1675[2] and wall construction possibly by 1680.[3] Despite references to tabby in the sixteenth and seventeenth centuries, little use was made of the material until after the British siege of St. Augustine in 1702. In fact, St. Augustine was described in most early accounts as a city built entirely of wood.

In 1586, Sir Francis Drake, while returning to England from the Caribbean, came upon St. Augustine. Lt. Cates reported that the Spanish population, when confronted by Drake's fleet of more than 20 vessels, quickly abandoned the city.[4] The English then sacked and burned the buildings in the settlement. A plan of the town, which accompanied Drake's report of the incident, shows a fort (Fort San Juan de Pinos)[5] and a number of small, rectangular houses with gabled roofs.

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[1]P. Menendez Marques, "Letter to the Crown, Santa Elena, 25 March 1580," Colonial Records of Spanish Florida (Deland, Florida: Florida State Historical Society, 1925) 2:315.

[2]J. C. Harrington, A. C. Manucy, and J. M. Goggin, "Archaeological Excavations in the Courtyard of the Castillo de San Marcos," Florida Historical Quarterly 34 (1956): 137.

[3]Hale G. Smith, "Final Field Report of the Archaeological Investigations of the Arrivas House."

[4]Lt. Thomas Cate's account of Drake's raid on St. Augustine, Florida, 1586 cited in The History of Castillo de San Marcos and Fort Matanzas from Contemporary Narratives and Letters (Washington, 1943), p.7 (A. C. Manucy, editor).

[5]Drake's account describes Fort San Juan de Pinas as built entirely of wood and surrounded by a wall, or pale, formed of the upright trunks of large trees. The platforms at the fort were made of rammed earth and horizontally laid tree trunks. George R. Fairbanks, History and Antiquity of St. Augustine, Florida (Jacksonville, Florida, 1881), p. 58. See also Boazio, 'S. Augustini pars est Floridae . . . Map ,' in "Expeditio Francesci Drake" (1986) n.p.

The Latin legend stated that the town was built of wood and was reduced to ashes by the English raid.

Apparently the city was rebuilt rapidly. A sketch drawn in 1593, seven years after Drake's raid, depicted a completely reconstructed St. Augustine. The structures shown on this map, appear to have been built of vertical boards with roofs of thatch.[1] The text which accompanies the map indicates St. Augustine had some 120 houses and population of 700 at this time.[2]

However, a series of disasters plagued the city for years. By 1599, fire and a devastating storm had destroyed most of these structures. The buildings that replaced them were also of board-and-thatch construction. Judging from the frequency of fire in the years following, these structures probably lasted only a short time before they too were destroyed.[3] However, despite the threat of fire and storm, wood and thatch were the favored building materials until well into the eighteenth century.

The introduction of studier, less combustible, structural materials occurred relatively late at Spanish St. Augustine. The two most important materials, tabby and coquina, had similar developmental

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[1] Chatelain notes, "The roofs on early St. Augustine houses were usually steeply pitched and thatched with palmetto or palm leaves or sometimes swamp grass." Vernon E. Chatelain, The Defenses of Spanish Florida, 1565-1573 (Washington, D.C., 1941), p. 129.

[2] Fr. Andres de San Miquel, "Relacion de los Trabajos," Dos Antiguas Relaciones de la Florida (Mexico, 1902), pp. 205-206. (Garcia, editor).

[3] Maynard Geiger, The Franciscan Conquest of Florida, 1573-1618 (1937), pp. 122, 152, 187.

histories. For instance, the year 1580 was significant on two accounts; first, for the earliest reference to tabby roof slabs and second for the discovery of shellstone, or coquina, on nearby Anastasia Island.[1] With a single exception, no recorded use was made of either material until the late seventeenth century, when both tabby and coquina were employed in the construction of the "Castillo" for a limited amount of housing. Historical parallels continue through the eighteenth century, which was marked first by the popular use of the two materials for house construction between 1702 and 1763, and second by a general cessation of building activity following the Britsih occupation of St. Augustine in 1764. Such being the case, some discussion of coquina, as well as tabby is merited in this section.[2]

Though its discovery was first reported in 1580, the earliest documented use of shell stone was for a powder magazine built between 1596 and 1598. In letters to the King of Spain, written shortly after the magazine's construction, Florida's Governor Canzo stated his enthusiasm for the stone material and his resolve to replace St. Augustine's wooden fort with a new structure of coquina.[3] By 1602 some

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[1]P. Menedez Marques, 'Letter to the Crown, St. Augustine, 27 December 1583,' quoted in J. T. Connor, "Nine Old Wooden Forts of St. Augustine," Florida Historical Quarterly, 15:171.

[2]Coquina, in contrast to tabby, is a naturally formed material, made from broken shell and coral cemented together and quarried like other stone. Newly quarried coquina was light colored, soft, and porous and could be easily shaped into blocks of various sizes. With lengthened exposure, the stone turned a dark gray and acquired a durable quality. Chatelain, p. 31.

[3]Mendez de Canzo, 'Letters to the Crown, St. Augustine, 23 February 1598 and 22 September 1602,' "Florida MSS.," vol. 4.

blocks of the material had been quarried, but no work had been accomplished on the fort.[1]

Nearly seventy years elapsed before additional blocks of coquina were quarried on Anastasia Island. Spanish records indicate the construction of the new stone fort (the Castillo de San Marcos) was actually begun in 1672 and completed in 1698.[2] Few new structures were built in St. Augustine during the twenty-six year period of the fort's construction. The fort apparently had priority over all other projects. The houses and public buildings that were constructed were primarily though not exclusively of wood construction.[3] One possible exception to this was the predecessor of the Arrivas House, which may have been built of ripio (tabby).

Excavation at the Arrivas House has provided evidence of tabby wall and floor construction. The wall remnants, which were from a pre-existing structure, were considered contemporary with the oldest fragments of floor. Based on ceramic associations, these tabby floor sections were tentatively dated to the period between 1650 and 1700.[4]

Tabby flooring of supposed comparable antiquity has been discovered in the course of archaeological excavations at the Castillo

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[1]Charles W. Arnade, Florida on Trial (Miami: University of Miami Press, 1959), p. 16.

[2]Albert C. Manucy, The Building of Castillo de San Marcos (Washington, D.C.: U.S. Government Printing Office, 1942).

[3]Salazar, "Letter to the Crown, 15 December 1680," St. Augustine. Translation in Manucy, Houses of St. Augustine, p. 20.

[4]Smith, "Final Field Report on the Arrivas House."

de San Marcos and at the 14 St. Francis House. At the Castillo, tabby floors were reported at the sally port and in a powder magazine located in the courtyard. Manucy noted, "the sallyport of the castillo . . . contained remnants of a brown tabby floor built about 1686."[1] The floor of the magazine is given an even earlier date, as it was thought to have been laid shortly after the construction of the coquina walls in 1675.[2] At the 14 St. Francis House, several sections of floor were dated to the period between 1680 and 1710.[3] Because of supportive documentation, the best dates for tabby floor construction come from the Castillo, while those from the Arrivas House and the 14 St. Francis House should be considered tentative, particularly in view of a recent reevaluation of dating material.[4]

In the final stage of construction of the fort, a restriction on residential construction was lifted. In 1690 Governor Diego de

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[1]Albert C. Manucy, Notes on the Excavation at the Colonial Floors in the Sallyport and Guardroom Area at Castillo de San Marcos, U.S. Department of the Interior, National Park Service, Region 1, 1960, p. ii.

[2]Harrington, Manucy, and Goggin, p. 137.

[3]Hale G. Smith, "Archaeological Excavations at the Oldest House, 1958," Evolution of the Oldest House.

[4]In a recent letter, Robert Steinbach of the Historic St. Augustine Preservation Board noted the dating sequence applied by Hale Smith to the floors of the Arrivas House now needs to be revised. The same would be true of that used to date the 14 St. Francis House. Steinbach wrote:

> "Since the 1960 excavation of the Arrivas House, some of the ceramic types that were used in dating these floors has come under more intensive study and their terminus post quem dates have been revised, in a number of cases upward in time. This would, of course, change the interpretation of the data from this site." Robert Steinbach, personal letter, 3 December 1974.

Quiroga requested permission to rebuild with stone three houses owned by the crown. These included the houses of the governor, treasurer, and accountant. Permission was granted with the provision that the fort first be completed.[1] The Governor's House, completed in 1701, ranked as the first domestic dwelling in St. Augustine to be built entirely of coquina.[2] During the 1690s requests also were made for use of coquina in private construction. In consideration of the petition, Governor Quiroga reported to the crown, that it would be ". . . useful and a convenience . . . for this city to introduce stone building, because of the repeated fires caused by wooden ones."[3] As a result, some broken stone was sold to city residents.[4] Its primary use, however, was in the foundations of frame houses.

The First Spanish Period - Late Phase (1702-1763)

Further progress in replacing the city's wooden buildings with more durable materials was interrupted by a British siege of St. Augustine in 1702. As the siege ended, only some twenty houses, the fort, one church, and the hospital were left standing.[5] Two reports of

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[1]Diego de Quiroga y Losada, "Letters to the Crown, 1 April 1688 and 8 June 1690," St. Augustine. Cited in Manucy, Houses of St. Augustine, p. 20.

[2]"Residencia de Zuniga, 1707." Translation in John W. Griffin and Albert C. Manucy, "The Development of Housing in St. Augustine to 1783," Evolution of the Oldest House, Notes in Anthropology, vol. 7, p.8.

[3]Quiroga in Manucy, Houses of St. Augustine, p. 21

[4]Ibid.

[5]Charles W. Arnade, The Siege of St. Augustine in 1702, Social Science Monographs, no. 3 (Gainesville, Florida: University of Florida Press, 1959), p. 57.

this destruction were as follows:

Father de Alacano wrote:

> The fire was so voracious that nothing, not even a vestige, was left of these churches, the convent, and the doctrinas, because construction, including roofs and fences, was of wood.[1]

The Council of War, in 1703, declared:

> They [the British] abandoned the undertaking and applied themselves to destroying the city as they did with such furor that only the hospital and some twenty damaged houses remained; all the others were burned, and especially the parochial church, and the convent of St. Francis, the mission of Nombre de Dios . . . and six other missions without a sign of them remaining since they were built of wood. . .[2]

The years immediately following the British attack were spent in rebuilding the city.[3] Military and municipal construction had priority over housing.[4] In 1709 Governor Corcoles wrote of the inhabitants as "living in the street in some scanty shelters of straw."[5] By 1715 conditions had improved considerably. Solana reported:

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[1]Fray Martin de Alacano, "Memorial, St. Augustine, 2 August 1703," Translation in Arnade, The Siege of St. Augustine in 1702, p. 58.

[2]"Council of the Indies, 30 April 1703," Translation in Griffin and Manucy, Evolution of the Oldest House, p. 9.

[3]The appraisal made after 1702 showed that 118 persons (some owning more than one house) had lost houses in the British siege. The appraised values of the house ranged from 80 pesos ". . . because it was the oldest house" to 8,000 pesos for the governor's new residence, built of coquina. The total value of the destroyed property came to 47,140 pesos. Arnade, The Siege of St. Augustine, pp. 58-59.

[4]Bernard Nieto de Caraval, "Autos, 2 and 4 April 1707," and Zuniga, 1707 cited in Griffin and Manucy, Evolutions of the Oldest House, pp. 9-10.

[5]Francisco de Corcoles y Martinez, "Letter to the Crown, 13 August 1709," St. Augustine. Translation in Manucy, Houses of St. Augustine, p. 25.

> The number of houses which have been constructed and finished in stone and tabby is many since his Excellency Gov. Corcoles entered into the administration of the city. Everyone was in very wretched state, two or three families living in a single house because of not having the wherewithal for construction, today [1715] the city is very much along and well populated. . .[1]

Fiscal records indicate that rebuilding continued through 1718.[2] In 1743 about 300 houses were reported in St. Augustine.[3] By 1764, Elixio de la Puente's survey showed that the number had increased to 342. The new construction seems to have employed more varied materials than in previous periods. Elixio's housing survey, taken in 1764, provides statistics on both the numbers of houses in St. Augustine and their construction materials (Table 1).

Wood as indicated in table 1 continued to be used in residential construction, but was no so popular as it had been before the British siege. It was largely replaced by stone and tabby construction. Between 1703 and 1763, over 100 houses and a score of public buildings were built of stone.[4] These impressive numbers were only exceeded by the number of new houses constructed of tabby and tabby used in combination with wood.

The decision to rebuild St. Augustine of stone and tabby was made prior to 1715 and was predicated on the economic and political events of the period. At least four factors were involved: 1) the desire to rebuild St. Augustine with fire resistant materials; 2) the

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[1]Religious and others, "Letters to the Crown, 4 March 1715," Translation in Griffin and Manucy, Evolution of the Oldest House, p. 11.

[2]Manucy, Houses of St. Augustine, p. 27.

[3]"Plan and View of St. Augustine Castle and Matance's Fort," MS. description of St. Augustine and its defenses, with sketches, 1743. Photostat at the Library of Castillo de San Marcos National Monument, St. Augustine.

[4]Elixio de la Puente, 1764, 18 pp.

TABLE 1

SUMMARY OF ST. AUGUSTINE HOUSING IN 1764

Number of Houses	Basic Materials of Construction
48	tabla (wood)
133	ripio (tabby)
105	piedra (stone)
29	ripio y tabla (tabby and wood)*
20	piedra y ripio (stone and tabby)
5	piedra y tabla (stone and wood)
2	guano (palm thatch)
342	

SOURCE: Juan Joseph de Elixio de la Puente, MS. key to map entitled "Plano de la Real Fuerza, Baluarte y Linea de la Plaza de Sn Agustin de Florida . . ." 22 January 1764. Translated by A. C. Manucy. Mimeographed, 18 pp.

*Detailed information on tabby and wood houses, stone and tabby houses, and stone and wood houses is generally restricted to descriptions of specific houses. These examples have come primarily from property claims of the 1764-1784 period and Rocque's survey of 1788 and while limited, do provide insight into the nature of the three categories of housing. For instance, entry no. 118 - a stone and tabby house on Puente's key (1764) has been equated to no. 251 on Rocque's survey (1788), which as a 2-story squared stone house with some tabby partitions. Entry no. 129 on Rocque's survey, obviously a tabby and wood structure, was described as a tabby and post thin walled house, with a timber frame second story. No doubt most stone and wood houses were similar in form. However, an exception to this was a house, described in British property claims, as having stone gable ends and a wooden middle section. Wilbur Siebert, Loyalists in East Florida, 1774-1775, 2 vols. (Deland, Florida: The Florida State Historical Society, 1929), 2: 84; Mariano de la Rocque, MS. key to map entitled "Plano Particular de la Ciudad de Sn. Agustin de la Florida." 1788. Entries 129, 251.

availability of shellstone for domestic use; 3) new developments in tabby construction; and 4) a shortage of wood. The destructive fires of 1702 were convincing proof of the hazard presented by St. Augustine's wooden buildings.[1] This recognition, coupled with the imposed opportunity of replacing these structures, was an important factor in the widespread use of stone and tabby after the British siege. Two other contributing circumstances were the availability of stone (coquina) and developments in tabby construction, which also occurred in this period. Coquina (shellstone), which was previously reserved for the construction of the Castillo and other military projects, became available for residential use just prior to the British attack of 1702.[2] After the siege, the wealthier citizenry took advantage of the new ordinance on stone and rebuilt their homes of the material. If John Bartram's account is correct, the city's poorer residents constructed tabby houses.[3] It is likely that stone was a more expensive building material, both because of the costs of quarrying and transport to St. Augustine, and the limited supply of stone on Anastasia Island.[4] For those unable to afford stone, tabby was an acceptable alternative. Outwardly stone and

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[1]A similar observation was made by Spanish Governor Quiroga in 1690. See quote on page 7; Quiroga in Manucy, Houses of St. Augustine, p. 21.

[2]Ibid.

[3]John Bartram, Diary of a Journey Through the Carolinas, Georgia, and Florida From July 1, 1765 to April 10, 1766 (Philadelphia: 1942) (Francis Harper, editor), p. 55.

[4]The Spanish concern with the supply of stone on Anastasia Island is inferred from the strict regulations put on its use in the seventeenth century (prior to the completion of the Castillo) and by the inventory made of the quarry in 1690 to determine the sufficiency of stone for both public and private uses. Quiroga in Griffin and Manucy, Evolution of the Oldest House, p. 7; Manucy, Houses of St. Augustine, p. 20.

tabby houses presented similar appearances, distinguishable more by architectural style and quality of construction than by material.[1] More than one observer misrepresented the city's tabby housing and declared that all the houses were built of stone.[2] The mistake, was, of course, understandable; first, because good tabby strongly resembled shellstone and was used for similar constructional purposes and second, because the practice of stuccoing the exterior effectively concealed both stone and tabby.[3]

The hypothesized lower cost of tabby and its resemblances to stone are then plausible explanations for the boom in tabby housing during the 1703-1706 period. However, a necessary prerequisite for the material's popularity was the introduction of relatively simple technique for tabby wall construction. Two separate methods of wall construction are indicated for this period: 1) layered construction, which employed movable wooden forms; and 2) ostion y postes - a post and beam construction with masonry curtain walls.[4] Neither technique was specifically developed for tabby construction. The first, and probably most

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[1]A uniform appearance of buildings was a stated objective in Spanish town planning. See Ordiance no. 134, "Royal Ordinance Concerning the Lay Out of New Towns (3 July 1573)," (Zelia Nuttal, translator), Hispanic American Historical Review (May 1922) 5: 253.

[2]"Plan and View of St. Augustine Castle . . ." (1743); William Stork, A description of East-Florida with a Journal Kept by John Bartram of Philadelphia, Botanist to His Majesty for the Floridas . . . (London, 1765), p. 12; Bernard Romans, A Concise Natural History of East and West Florida, vol. 9 (New York: Printed for the author, 1775) Reprinted by New Orleans: Pelican Publishing Co., 1961, p. 175.

[3]"File: Architecture: Building Materials (Includes Tabby)" St. Augustine Historical Society; Manucy, Houses of St. Augustine, pp. 70-71.

[4]Robert H. Steinbach, "Interim Research Report Block 38 Lot 6," Mimeograph, 6 July 1969, pp. 1-2; Rocque, Entry no. 129.

common mode of construction was traditionally associated with pise and tapia, whereas the second was used in a variation of post-and-pan construction.[1] The building methods may have been applied initially to tabby construction between 1680 and 1710.[2] The success of experiments in this period would seem to be a necessary pre-condition for the large-scale program of tabby building after the siege.

The transition to stone and tabby construction also resulted from a shortage of wood materials after the British attack.[3] By 1700, the timber resources in the immediate vicinity of St. Augustine were exhausted, and wood materials had to be obtained from more distant locations (some as far as 50 miles from the city). Between 1703 and 1720, however, British instigated Indian attacks made wood cutting expeditions at best hazardous and for several years impossible.[4]

The character of St. Augustine housing from 1709-1763 is known primarily form eighteenth century descriptions. The most detailed accounts have come from English observers and date from the British occupation of the city between 1764 and 1784. For example, John Bartram (writing ca. 1765) provides an outstanding description of St. Augustine's stone and tabby houses.

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[1]Albert C. Manucy, The Fort at Frederica, pp. 57-59.

[2]Smith, "Final Field Report of the Arrivas House."

[3]Corcoles in Manucy, Houses of St. Augustine, p. 25.

[4]Ibid; James W. Covington, "Some Observations Concerning the Florida-Carolina Indian Slave Trade," The Florida Anthropologist (March-June 1967), 20: 12, 15.

> These best houses is [sic] generally built of hewn stone, as is most of those that is [sic] flat roofed and terraced[1] on top. with stone battlements, which have pipes, mostly of burnst clay, let through the wall and projecting a foot or more to carry off the water.
>
> As they had no chimneys, so they had no glass windows, but the best houses had large windows next to the street all bannistered and projecting a foot or more from the house wall . . . .
>
> But most of the common Spanish houses was built of oyster shells and mortar, as well as garden and yard walls. They raised them by setting two boards on edge as wide as they intend the wall, then poured in lime-shell mortar mixed with sand, in which they pounded oyster shells as close as possible. And when that part was set, they raised the planks, and so on till they had raised the wall as high as wanted. This was strong enough to support a terraced chamber floor and palmetto thatched roof, which was very tight. But as most of these was built by the common soldiers and poor people at different times, as they could get money to enlarge them, the new and odl walls is apt to wind and crack so that soldiers can easily pull them to pieces for their wood to burn, which is scarce here. These last mentioned houses had also their little bannistered and latticed windows, and some had a hole through the roof to let out the smoke when they cooked their victuals, a little of which served them and that very mean . . .[2]

Table 2 summarized the similarities and differences between stone and tabby houses of the 1703-1763 period. The data for this table have been derived from multiple sources. The most important of which were the narrative descriptions of British travelers (e.g., Bartram, Stork, Romans, Smyth), archaeological excavations of the 14 St. Francis St. House and the Arrivas House, property claims from the British period, and Rocque's survey of 1788.[3]

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[1] In eighteenth century architectural literature, "terrace" or "terrass" referred both to a certain natural cement and to cement in general. Bartram used the term in its broader sense, for in St. Augustine, the term "terrace" was clearly synonymous with "tabby." John Muller, Treatise Containing the Practical Part of Fortification (London, 1755), pp. 111-112.

[2] Bartram, pp. 52, 55.

[3] Ibid; Stork, p. 12; Romans, p. 175, J.F.D. Smyth, A Tour in the United States of America: Containing an Account of the Present Situation of that Country, The Population, Agriculture, Commerce, Customs, and

TABLE 2

STONE AND TABBY HOUSES OF THE 1703-1763 PERIOD

House and Yard Components	Stone Houses	Tabby Houses
Wall Materials	Coarsed-squared-rubble stone (coquina)	Tabby
Floor Plans	St. Augustine, Common Spanish, Wing Plan	Common Spanish, some St. Augustine
Number of Stories	one story, two story	one story, some two story
Wall Finishes	Stucco and plaster	Stucco, plaster, and whitewash
Partitions	Stone, tabby, wood	Tabby, wood
Floor Materials	Tabby	Tabby, earth
Ceilings	Plaster, wood	Plaster
Roof Materials	Tabby slab, wood shingle, some thatch	Palmetto thatch, thatch
Roof Slope	Flat (tabby), pitched 53° (wood shingle)	Pitched 45° (palmetto thatch)
Chimneys	Smoke hole only	Smoke hole only
Windows	Bannistered and latticed	Bannistered and latticed
Yard Enclosures	Stone walls, tabby walls, split pale fences	Pale fences, tabby walls
Outbuildings	Detached kitchen	Occasional kitchen
Misc. Yard Structures	Tabby walkways, tabby benches, outside tabby stairway	-----

Table 2 provides three types of information pertainment to tabby's history in St. Augustine: 1) the distinctions between tabby and stone housing, 2) the general qualities of tabby houses, and 3) the most important, the multiple uses of the building materials in Spanish housing.

Manners of the Inhabitants . . . (London: G. Robinson 1784) vol. 2, pp. 33-34; Smith, Evolution of the Oldest House, p. 86; Smith, "Final Field Report of the Arrivas House"; Wilbur H. Siebert, Loyalists in East Florida, 1774 to 1785, The Florida State Historical Society (Deland: 1929) vol. 2: Records of Their Claims and Losses of Property in the Province, pp. 20-23, 30-32, 63-64, 70, 84, 88, 116-120, 126-128, 130-133; Rocque.

The diversity of tabby construction in eighteenth century St. Augustine is noteworthy. Its uses in housing included: exterior walls, flat roofs, floors, interior partitions, yard walls, walkways, benches, and outside stairways. Floor construction was especially widespread. Tabby floors were common in both stone and tabby houses and are indicated for both single and multi-story structures. Tabby slab roofs had a more restricted distribution. In 1759, Solana reported twenty-three masonry roofs, which accounted for eight percent of the total roofs in St. Augustine.[1] The slab roofs were found invariably on stone houses, whereas tabby houses all had thatched roofs. No statistics are available on the precise number of tabby yard walls, walkways, partitions, benches and stairways, for the 1703-1763 period. Tabby yard walls were probably commonplace and employed in conjunction with both stone and tabby housing. Comparatively fewer tabby walkways, interior partitions, benches and outside stairways were constructed, for these structures were associated with the better stone houses, particularly the elaborate two-story dwellings.[2]

Undoubtedly, the most important and conspicuous use of tabby in the first Spanish period was for housing, both in its capacity as a basic construction material and for its other diverse uses (e.g., flat slab roofs, floors, partitions, stairways). Yet discussion of the material would be incomplete without some reference to its other uses between 1703 and 1763, such as in military and municipal construction.

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[1]Juan Joseph Solana, "Report on the Condition of St. Augustine, St. Augustine, 22 April 1759." Cited in Manucy, Houses of St. Augustine, p. 102.

[2]Bartram, p. 52; Rocque, no. 124.

Archaeologists have recovered several selections of tabby pavement and floor at the Castillo de San Marcos. Both have been dated to the 1738-1739 period or shortly thereafter, when the fort was enlarged and modernized.[1] Tabby's utility in municipal construction is less well documented. Probable uses included floors, roofs, and street paving.

The British Period (1764-1783)

In 1763, as part of the settlement of the Seven Years War, the British were given title to the Spanish territories of Florida. This officially ended the first period of Spanish rule in Florida. A change in ownership also brought about a change in the composition of the population. Spanish nationals were encouraged to leave. Spanish authorities warned residents of the consequences of British rule and offered them generous remuneration in Cuban land for losses in Florida.[2] As a result, nearly the entire population (some 3,103 persons) left Florida for Havana (Cuba) and Campeche (New Spain) between April 1763 and January 1764.[3] The British entrance into Florida immediately followed the Spanish embarkation.

The British displacement of the Spanish in St. Augustine effected significant change in the character of the city's housing. In 1764, shortly after the Spanish evacuation, 342 houses were reported in the

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[1]Harrington, pp. 127-128; Albert C. Manucy, "Tapia or Tabby," p.33

[2]Melchior Felia, 'Letter to Count de Ricla, 8 July 1763,' "Report of the State of East and West Florida, 1763," (Lt. Col. Robertson - Military Corresp. Sec. of St. Office).

[3]Robert L. Gold, Borderland Empire in Transition: The Triple-Nation Transfer of Floirda (Carbondale: Southern Illinois University Press, 1969), pp. 66-67.

city.[1] Almost half of these houses (mostly those of wood and tabby construction) were destroyed in the first year of British occupation.[2]

TABLE 3

BRITISH CHANGES IN FORMER SPANISH PROPERTIES

Property Description	Repairs, Alterations, Additions
(Spanish) house, stone, shingle roof; good condition (1763)	Added chimneys
(Spanish) house, stone gable ends, wooden middle, 40' front x 18', 1 1/2 story, shingle roof, glass. Fence 8', stone in front clapboard elsewhere. (1777)	Converted a wall to a kitchen. Added full length piazza with room at end. Built frame store, 12' x 50' shingle roof, New clapboard fence, 6 1/2'.
"Old Spanish" house, 31' (front) x 38'. Another building. No fence. (1778)	Repaired house roofs, floors, wall plaster; glazed and painted. Converted other building to kitchen and store, built adjoining shed. Fenced.
(Spanish) house, stone, square, flat roof, 6 rooms each floor; out of repair, one room fallen. (1778)	Converted to gable roof; rebuilt fallen room, added chamber oven; repaired back door and 2 windows; added chimney. Added frame stable with the roof, oven, slaughter house, well.
(Spanish) house, stone, 1-story, no glass. Small frame kitchen. (1778)	Repairs: floored large room, made and glazed 5 new windows, put in new doors and locks; added "look out" at end of house. Added stone chimney to kitchen. Built frame storehouse, "not well finished." Built 6-horse fr. stable.

SOURCE: Siebert, 2:20-23, 84, 88, 116-120, 126-128. After Manucy, Houses of St. Augustine, pp. 38-40.

[1]Elixio de la Puente, 18 pp.

[2]John Bartram, "Letter to P. Collinson, 26 August 1766," in William Darlington, Memorials of John Bartram and Humphry Marshall (Philadelphia: Lindsay and Blakiston, 1849), pp. 283-284.

The remaining houses were variously altered to accomodate British administrators, military personnel, and assorted tradesmen. Modifications largely consisted of repairs, alterations, and additions. Table 3 documents some typical changes made in Spanish properties. Finally, new houses were constructed in the city. Most houses were timber-frame, sided with clapboard or weatherboard and roofed with shingles, a design distinctly different from that of existing Spanish houses.[1]

British rule continued until the 1780's. In 1783, with the signing of the Treaty of Paris, the Florida territories were returned to Spain. Rocque's housing survey, taken in 1788, described housing in St. Augustine soon after Spain's reentry into Florida. A comparison of Rocque's statistics with those of the 1764 survey provides useful data on the magnitude of change which occurred in the twenty years of British occupation. (see Table 4)

The comparison of the two surveys shows first a decrease in total number of houses from 1764 to 1788 and, second, a new ranking of construction materials. Wood, for example, dominated construction in the British period. From 1764 to 1788 the number of wood structures increased from 48 to 127. The number of stone and tabby houses declined during the same period. The number of structures that were tabby or tabby and wood, or a tabby and stone combination decreased from 182 to 31. Losses for the period totaled 151 (120 tabby houses, 25 tabby and wood houses and 6 stone and tabby houses).

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[1]Manucy, Houses of St. Augustine, p. 36.

TABLE 4

ST. AUGUSTINE HOUSING IN 1764 AND 1788

1764 (Elixio)			1788 (Rocque)		
No. of Houses	Material	%	No. of Houses	Material	%
48	tabla (wood)	14	114	madera (wood)	43
--	-----	--	13	madera y rajones (shakes)	5
133	ripio (tabby)	39	13	ostion (tabby)	5
105	piedra (stone)	31	94	mamposteria (stone)	36
29	ripio y tabla (tabby and wood)	8	4	ostion y madera (tabby and wood)	2
20	piedra y ripio	6	14	mamposteria y ostion (stone and tabby)	5
5	piedra y tabla	1 1/2	9	mamposteria y madera (stone and wood)	3
2	guano (palm thatch)	1/2			
--	-----	--	2	cujes y barro (wattle and clay)	1
342		100	263		100

SOURCE: Juan Joseph de Elixio de la Puente, "Plano de la Real Ruerza, Baluarte, y Linea de la Plaza de Sn. Agustin de Florida . . ." (St. Augustine) 22 January 1764; Mariano de la Rocque, "Plano Particular de la Ciudad de Sn. Agustin de la Florida" St. Augustine, 1788.

Between 1764 and 1788, St. Augustine's housing underwent a transformation. Obviously, the disappearance of tabby housing was instrumental in this metamorphosis. Reasons for the demise of tabby in the British period include the deliberate destruction of some houses,[1] lack of maintenance of others, and the failure to construct new houses of the material. The property maps of the two surveys show no new tabby housing for the 1764-1788 period. Buildings extant in 1788 were remnants from the earlier Spanish occupation. The same applied to tabby slab roofs, outside paving, yard enclosures, and exterior stairways in St. Augustine. Some tabby floors, however, have been dated to the British period. Tabby floors of the 14 St. Francis St. House, the Arrivas House, and "Rocque 226" are included in this category.[2] These floors, like others constructed in British-occupied St. Augustine, merely supplanted older, worn tabby floors dating to the Spanish era.[3]

The Second Spanish Period (1784-1821)

The Spanish reentry into Florida in 1784 brought few changes in the housing of St. Augustine. Patterns established by the British were continued with the Spanish reoccupation. New houses in the second Spanish period were British-style timber-frame or stone.[4] The few

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[1]Bartram, p. 55.

[2]Hale G. Smith and Robert H. Steinback, Rocque 226, Notes in Anthropology, vol. 9 (Tallahassee, Florida: The Department of Anthropology, Florida State University, 1963), p. 9.

[3]Smith, "Final Field Report of the Arrivas House."

[4]Manucy, Houses of St. Augustine, p. 62.

tabby houses in the city were vestiges of the 1702-1763 period of Spanish rule. Existing tabby flat roofs were also from the first Spanish period (late phase). Only two uses of tabby were reported for the 1784-1821 period. These were for floor construction and street paving. In 1823, an observer noted, "almost all [dwellings] in the northeast quarter are laid with tabbia flooring."[1] Archaeologist Hale Smith confirms this observation in the dating of tabby floors in the 14 St. Francis House.[2] The evidence for street paving is less conclusive. In 1843, William Cullen Bryant reported:

> . . . that in the time when the town belonged to Spain, many of them [the streets] were floored with artificial stone, composed of shell and mortar, which in this climate takes and keeps the hardness of rock; and that no other vehicle than a handbarrow was allowed to pass over them. In some places you see remnants of this ancient pavement; but for the most part it has been ground to dust under the wheels of the carts and carriages introduced by the new inhabitants.[3]

The use of tabby for street paving is not disputed, only the antiquity. Bryant does not distinguish between the two periods of Spanish control. The tabby pavement, in the above description, could have belonged to the first Spanish period, rather than the second.[4]

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[1]Charles Vignoles, Observations Upon the Floridas, 1823, p. 113.

[2]Smith, Evolution of the Oldest House, p. 51.

[3]William Cullen Bryant, Letters of a Traveller, April 1843, pp. 101-102.

[4]In 1775, Bernard Romans noted, "The sandy streets [in St. Augustine] are hardened by lime and oyster shells." Bernard Romans, A Concise Natural History of East and West Florida, vol. 1 (New York: Printed for the author, 1775). Reprinted by the Pelican Publishing Co., New Orleans, 1961, p. 175. Roman's statement definitely established tabby street paving in the city prior to the return of the Spanish in 1784. However, this does not preclude its use in the second Spanish period as well.

The second Spanish period was notable for the near absence of traditional Spanish construction, a condition attributable to the size of St. Augustine's population between 1784 and 1821, its variable composition, and to the architectural inheritance of the British period. The Spanish were a numerical minority in St. Augustine. Of the estimated 1,000 persons in the city, fewer than 100 were Spaniards, and most of these were either natives of Florida or Canary Islanders. The majority of residents were of either Minorcan, Greek, Italian, British or African ancestry.[1] The small size of the population and its diversity had a three-fold effect on construction in St. Augustine. First, houses, left from the British period more than met the needs of the 1,000 or so persons in the city between 1784 and 1821. Hence, new construction was limited. Second, the small number of Spaniards in the city's population weakened the Iberian influence on architectural design and constructional methods. Third, the diversity of the remaining population reduced support for newly introduced styles and building techniques. As a result, the few houses built in the second Spanish period duplicated the form and constructional methods of existing housing (the inheritance of the British occupation).

The American Period (1822-1870)

In 1821, the Florida territories were transferred to the United States. This officially ended the second period of Spanish rule. Most of the Spanish citizenry left St. Augustine at this time. However, the American entry into Florida following the Spanish evacuation filled

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[1]Manucy, Houses of St. Augustine, p. 43.

the city with new residents. St. Augustine's housing was affected in two ways: 1) American immigrants took over and modernized the houses of the former inhabitants, and 2) the new settlers constructed a number of new houses. Alternatives of Spanish stone housing included, among other things, the destruction of second story tabby floors and tabby slab roofs. In 1837, John Lee Williams reported:

> Most of the old houses are two stories high, the lower floor of which is of tabby; in some instances the upper floor and roof are of the same material. These are now generally removed, on account of their great weight, from the upper parts of the buildings.[1]

Flat slab roofs were superseded by gabled roofs. In 1843, W. C. Bryant quoted an acquaintance:

> Twelve years ago, said an acquaintance of mine, when I first visited St. Augustine, it was a fine old Spanish town. A large proportion of the houses which you now see roofed like barns, were then flat-roofed; they were all shell rock, and these modern wooden buildings were not then erected.[2]

Most new houses, after 1821, were timber-frame, though a few were constructed of stone or of a timber and stone combination. In 1837, half of the 300 houses in St. Augustine were of wood construction, the other half of stone.[3] These construction materials continued to be popular until sometime after the Civil War.[4]

By mid-century, nearly all pre-existing tabby construction had disappeared from St. Augustine. Most slab roofs had been removed

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[1]John Lee Williams, p. 118.

[2]Bryant, pp. 101-102.

[3]Williams, p. 118.

[4]Manucy, Houses of St. Augustine, p. 47.

and only vestiges of tabby street paving remained.[1] The destruction of tabby houses, which began in the British period and continued with the Spanish reentry into Florida, was completed during the American occupation. By 1892, two houses on Charlotte Street and a yard wall on St. George Street were all that were left of the tabby housing which had been included in the 1764 survey.[2]

The American interest in tabby was limited. Tabby floors were constructed in mid- and late-nineteenth century, but only to replace worn-out tabby floors in Spanish and British-built housing. This was certainly the case in the 14 St. Francis St. House, in which two sets of tabby floors in Room 6 have been dated to the American occupation: Floor 2 to 1860-1870 and Floor 3 to 1820-1840.[3] Floor 2 possibly was the last tabby floor ever constructed in St. Augustine. Floors laid after 1870 were concrete (made with commercial cements) or wood, not tabby.[4]

St. Augustine: A Center for Tabby Building (1570-1870)

The demise of floor construction in the late nineteenth century signaled the end of the era of tabby building in St. Augustine. From 1580 to 1870 the continuity of the building tradition had been maintained, though unevenly, by the Spanish in 1580-1763 and 1784-1821

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[1]Bryant, pp. 101-102.

[2]Eleanor Philip Barnes, 'An Interview with Emity Wilson, Summer 1952,' in "File on Architecture: Building Materials (Includes Tabby)," St. Augustine Historical Society, p. 4.

[3]Smith, Evolution of the Oldest House, p. 71.

[4]See page 125 for discussion.

periods, the British between 1764 and 1783, and the Americans from 1821 to 1870. Whereas the uses of the material and the number of structures varied considerably during the 400 year period, the geographic distribution of Spanish-built tabby and subsequent British and American construction was curiously restricted. Other than the roof slabs reported at Santa Elena (Port Royal, South Carolina), ca. 1580, tabby building was confined to the St. Augustine settlement. In other Florida communities, wood and wattle-and-daub[1] were the dominant construction materials for housing and church buildings and stone, wood, ceramic and sundried brick for military fortifications.[2]

The limited distribution of tabby may be attributed to the political, economic and social conditions of Spanish Florida in the first half of the eighteenth century. These included 1) Indian wars and military encounters with the British, and 2) the character of the outpost settlements in Florida. The same hostilities, which promoted tabby construction in St. Augustine in the 1702-1763 period, may have prevented its spread to other parts of Florida. Because of Indian

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[1]Wattle and daub construction involved a framework of poles (wattle) covered with a clay mixture (daub). The framework was composed of vertical posts set in the ground at irregular intervals (3 to 18 inches). The horizontal wattles were interlaced through the vertical posts and secured with leather thongs. The daub was made of a mixture of puddled clay and a dry fibrous medium, usually grass or palm fronds (palmetto). It was applied to the wattles on both sides until the walls were from 6 to 8 inches thick. The sides of the walls were then smoothed and plastered with slaked lime 1 to 3 mm. thick. At San Francisco de Oconee (Apalachee, Florida), only the interior portion was plastered, while at Santa Elena (Port Royal, South Carolina), the walls were also given an exterior coating. Mark F. Boyd, Hale G. Smith, and John W. Griffin, Here They Once Stood: The Tragic End of the Apalachee Missions (Gainesville: University of Florida Press, 1951) pp. 115, 119.

[2]Fort St. Marks (near Tallahassee) was built of hewn stone, Fort Louis (at Mobile) of brick (ceramic), Fort San Carlos (Pensacola) of

attacks and British harassment, a number of settlements were abandoned in this period and the survival of the others was in doubt.[1] For these reasons, little new construction (other than for military fortifications) took place in the outpost settlements. This in effect worked against the establishment of tabby or any other new material outside of the St. Augustine hearth. On the other hand, the city of St. Augustine, well defended by its stone fortress [the Castillo de San Marcos], assumed even greater social, political and economic importance amidst the enmities of the period. New construction (which included tabby) flourished; both to replace what had been destroyed in the British siege of 1702 and to fulfill the needs of an increased, affluent, and possibly more defense-minded populace.

The character of the Florida settlements and their perceived building requirements also were factors, which restricted tabby's distribution. In Spanish Florida, two types of settlement prevailed. These were mission communities (usually built in conjunction with Indian towns) and military outposts. Housing in these settlements was of simple wood and wattle-and-daub construction, because 1) the small, single purpose villages were intended to serve only as temporary outposts, thereby not requiring the construction of public buildings or sturdy housing, and 2) the communities lacked the financial resources

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brick (ceramic) and Fort San Luis (Apalachee) of palm posts backed with sundried bricks. Andrew Ellicott, The Journal of Andrew Ellicott (Chicago: Quadrangle Books, 1962), p. 201; "Map of Fort San Luis, and Legend, 1705," Apalachee, Florida.

[1]John Jay Tepaske, The Governorship of Spanish Florida 1700-1763 (Durham, North Carolina: Duke University Press, 1964), pp. 115-116, 160, 197; Charles W. Arnade, "Cattle Raising in Spanish Florida 1513-1763," St. Augustine Historical Society. Reprinted from Agricultural History, vol. 35, no. 3 (July 1961), p. 6.

for the construction of more costly tabby and stone edifices.

Charleston-Beaufort and the British Tradition

British-built tabby had a quite different history and distribution than that of Spanish origin. First, two diffusion hearths operated in the British realm. Second, the development of the British tradition took place after that of the Spanish. Finally, the distribution of British tabby was far less restricted than that of its Spanish counterpart. The Charleston-Beaufort area of South Carolina was both the primary center for British tabby and the location of the earliest British tabby in the southeastern United States. It was here that the British tradition first developed, and from this hearth, tabby eventually spread throughout the Sea Island district. Few details relating to the origin of the building tradition, are available, but the requisite skills for tabby construction probably were introduced from St. Augustine to the South Carolina coastal region about 1700. The English builders may have acquired their knowledge of tabby directly from observation and participation in the ongoing construction in St. Augustine,[1] or, perhaps indirectly, through the agency of a captive Spanish soldier or slave familiar with tabby construction in Florida.[2]

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[1]Despite the unfriendly relations between the Spanish and English colonies in the late seventeenth century, a 1670 treaty granted certain concessions to English vessels in distress in Spanish waters, which included permission to provision and undergo repairs in Spanish-American ports. This arrangement would explain the presence of Englishmen (e.g., Jonathan Dickinson) in St. Augustine in the 1690s. Joyce E. Harman, Trade and Privateering in Spanish Florida 1732-1763 (St. Augustine: St. Augustine Historical Society, 1969), pp. 5-6.

[2]James W. Covington, "Stuart's Town, The Yamasee Indians and Spanish Florida," The Florida Anthropologist. 21 (March 1968): 11.

Tabby in Charleston and Beaufort (1703-1725)

Though specific documentation as to the manner of tabby's introduction into the English provinces is lacking, reliable evidence is available regarding its initial occurrence, early uses, and general acceptance as a building material. The earliest, fully documented instance of tabby's use in English construction was its employment in a powder magazine, built in Charleston, between 1703 and 1713.[1] In 1703 the Common's House of Assembly authorized "a brick powder house to be built for the better defense of the said town . . . ."[2] The magazine, a single storied, eight-gabled structure was completed sometime prior to 1713 (Fig. 18). The principal materials used in its construction were tabby and red brick. The thirty-two inch walls consisted of an inner curtain or core of tabby and an outer curtain of facing of brick. This building mode, which was derived from Roman methods of masonry construction, was termed Opus reticulatum or brick-faced concrete.[3] In this connection, the outer curtains of brick or

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[1]Older examples of the material may exist. Local lore associates certain tabby remnants on Edisto Island (South Carolina) with the 1680s plantation of Paul Grimball, which was destroyed by the Spanish attack on Carolina coast in 1686. Nell S. Graydon, Tales of Edisto (Columbia, South Carolina: R. L. Bryan Co., 1955), p. 1. Unfortunately, no evidence, physical or documentary, has been found to substantiate the claim. To date, field surveys of the island have failed to locate any visible building remains at the site of the Grimball Plantation. This plantation is believed to have been located at the Point of Pines on the north side of Edisto Island.

[2]South Carolina Commons House of Assembly, 1703.

[3]The construction mode was originated by the Romans around the first century B.C. In early examples, roughly rectangular stones were employed in the facing. By the second century, A.D. brick had largely replaced stone for this purpose. Marion E. Blake, Ancient Roman Construction in Italy from the Prehistoric Period to Augustus (Carnegie Instituion of Washington, Pub. 570, Washington, D.C., 1947), p. 330; William MacDonald, "Some Implications of Later Roman Construction,"

Fig. 18. Powder magazine, built ca. 1703-13 (Charleston, South Carolina). From the collection of the Library of Congress

squared stone were built first, which provided the formwork for the inner core of concrete fill.[1]

This early use of tabby is significant in three respects. First, the decision to use a new material in the construction of an important public building. Indications here are that British builders fully accepted tabby's introduction and were well informed as to the nature of the material and the economics involved. Second, the recognition of tabby as a type of concrete. As evidenced by its role in the constructon of the magazine, Charleston builders considered tabby to be a concrete, rather than a mere building earth. Third, the departure from traditional methods of tabby building. The construction of the magazine was atypical of tabby building, as subsequent tabby structures were generally built in accordance with methods described in Chapter II. The Charleston powder house stands as one of the three known examples of brick or stone-faced tabby in the Southeast.[2] (Fig. 19).

As concerns the selection of the method of construction of the magazine, several possibilities may be suggested: 1) Brick-faced tabby (or concrete) may have been perceived as a superior mode of construction.[3] 2) The introduction of tabby as a building material may

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Journal of the Society of Architectural Historians, 17, no. 4 (1960): 2.

[1]Blake, pp. 325, 352.

[2]Brick-faced tabby was used a second time in South Carolina for the construction of the Beaufort Arsenal in 1795, and at the Kingsley Plantation, For George Island in the 1820s.

[3]The excellence of the materials and building method is attested by very permanance of the construction. The powder house remains in superb condition and currently is listed in the National Registry of Historic Places (1974) as the oldest public building in Charleston.

Fig. 19. Brick and tabby construction, Kingsley Plantation (Fort George Island, Florida)

have proceded that of the traditional tabby construction methods. 3) Though introduced as a complex of traits, the method of construction may not have been accepted as readily as the building material.

Of the three, the latter suggestion would appear the most plausible. The use of shuttering, or temporary wooden forms, was relatively unknown in British building at the beginning of the eighteenth century. Cob, possibly tabby's closest English relative, did not required shuttering as part of the construction.[1] Pise, or rammed earth construction, which is similar to tabby in method of construction, was not introduced into England until the very end of the eighteenth century.[2] Likely Charleston builders were not familiar with the construction techniques associated with tabby and required some period of experimentation prior to a complete acceptance of the building method. On the other hand, the building material appears to have been adopted quite readily, possibly because of its strong resemblance to concrete with which the English were familiar from Roman construction in Britain.

Based on available evidence, the earliest and only uses of shuttering by British builders between 1703 and 1725 were in the

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[1]J.B. Papworth in his Designs of Rural Residence (London, 1818) stated that pise was introduced into England by the late Mr. Henry Holland. Holland used this method for the construction of several cottages on his estate at Woburn in the1790's. As a result of his commendations, pise enjoyed a short period of fashionable patronage in the late eighteenth and early nineteenth centuries. Alec Clifton-Taylor, The Pattern of English Building (London: Bastsford, Ltd., 1962), p. 277.

[2]L.W. Neubauer, "Rammed Earth Technique in the United States," Housing and Town Planning Department of Social Affairs, United Nations, New York, (October 1950). Bulletin No. 4, p. 27.

construction of the tabby foundations of several large residences in Beaufort, South Carolina.[1] Tabby had definite advantages for this type of construction. Brick, the preferred material, was in short supply, for it had to be imported to the region. Tabby offered an inexpensive and suitable substitute (see map 2).

Tabby in the Beaufort Vicinity (1726-1742)

By the second quarter of the eighteenth century, the shuttering technique was employed in all tabby construction and the use of the material extended to its incorporation in entire buildings. Examples of this application are amply represented in such locations as Fort Prince Frederick, the "old White Church," and the main house of Retreat Plantation.

Owing to its low cost with respect to component materials and its inherent sturdy properties, tabby was an ideal material for military construction. It was particularly well suited to the building of coastal fortifications and other structures designed to withstand bombardments from attacking ships. The powder magazine in Charleston was the first such building, Fort Prince Frederick on Port Royal Island, South Carolina, the second.

Fort Prince Frederick was constructed between 1731 and 1734. The fort, which replaced the wooden Fort Beaufort, measured 125 by 75

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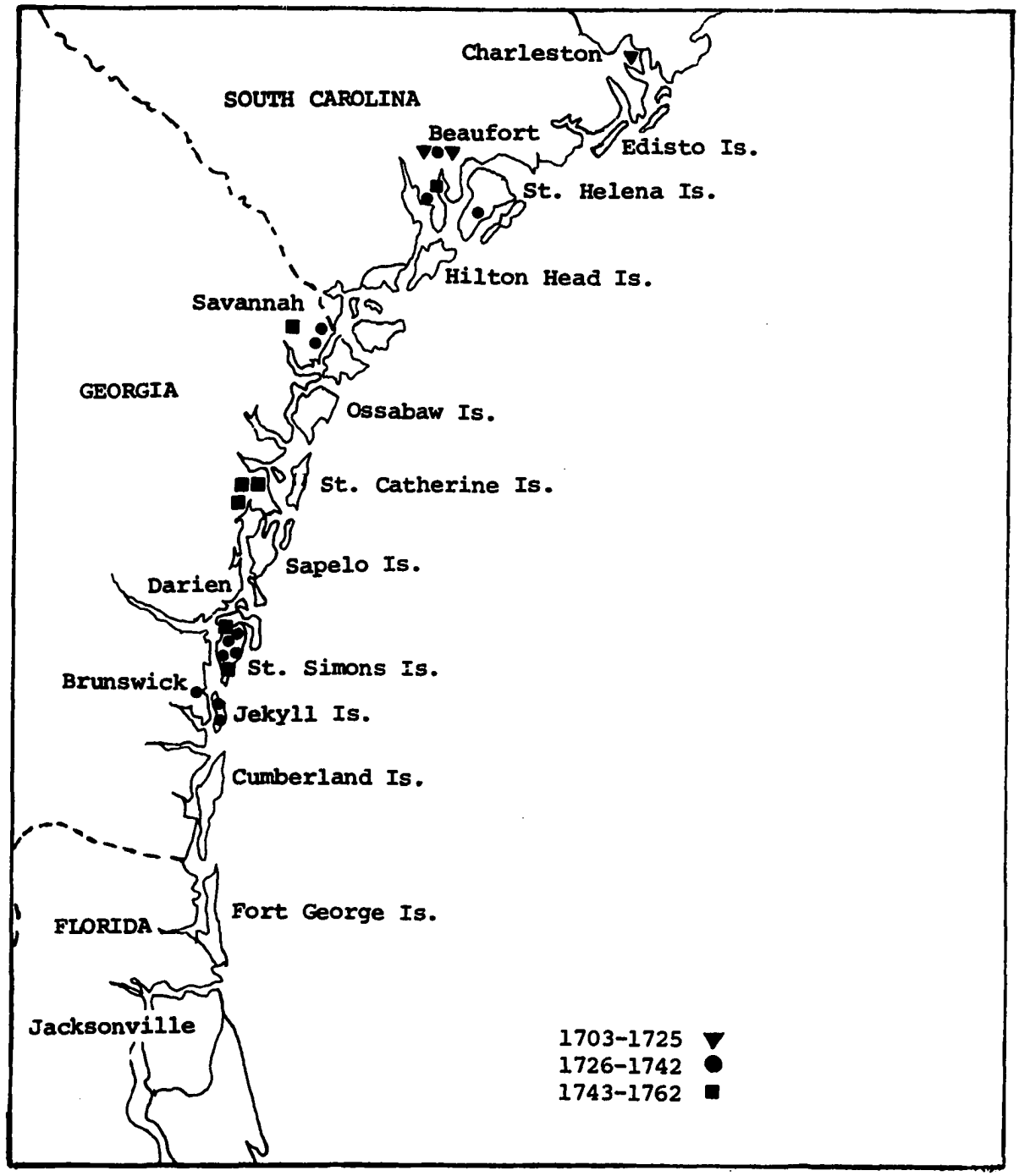
[1]The two oldest houses in Beaufort, South Carolina: The Hext-Morris House (Riverview), dated 1710, and the Hepworth-Pringle House (The Temple of the Sun), dated 1717-1722, have tabby foundations. The latter, built about the time of the Yamassee War, was constructed with musket slits in the foundation tabby.



Map 2. Tabby Construction of British Origin from 1703 to 1762

feet. Its tabby walls measured about five feet thick and four feet high on three sides.[1] It was regularly garrisoned until 1744, when the South Carolina Council[2] reported, "the fort had gone to ruin and was soon after abandoned." Other documents state, however, that soldiers were stationed intermittently at the fort until the new fortification, Fort Lyttelton, was begun in 1758.[3] The decision to construct a new fort was made by the Governor of the Province. Governor Glen criticized the old Fort Frederick on two counts,[4] its poor construction, and its injudicious locational situation.[5] Therefore, instead of

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[1]Larry E. Ivers, Colonial Forts of South Carolina, 1670-1775 (Columbia: University of South Carolina Press, 1970), p. 66.

[2]"Council Journals," MS., vol. 9, Part II, pp. 60-61; vol. 16, Part II, p. 103.

[3]The new fort (Fort Lyttelton) was begun in 1758, but not completed until late 1762. Fort Lyttelton, like Fort Frederick was built of tabby and earthen material. This fort, like its predecessor, deteriorated rapidly and by 1766 was abandoned. An estimate of the repairs required at the fort ran well over 3,000 . "Plan and Estimate of Repairs necessary for Fort Lyttelton," South Carolina Historical and Genealogical Magazine, (1901): 15-16.

The fort was put back in service in the Revolutionary period, but by 1785 was permanently abandoned. Period records state:

> "That John Joyner, William Hazzard Wigg and Robert Barnwell, Esqrs. be and they are hereby appointed commissioners for ascertaining the boundaries of the land on which Fort Lyttelton on Port Royal island formerly stood." Montrie, Memoirs (1785), 1: 290-291.

The remnants of the fort, visible on Spanish Point (one and a half miles south of Beaufort, South Carolina, on the opposite side of the river) have served as a landmark in the Beaufort area for almost 200 years. Charles Lyell, traveling in the year 1841, mistook the ruins for those of a Spanish fort, Lyell related:

> "An old Spanish fort, south of Beaufort, reminded me that this region had once belonged to the Spaniards, who built St. Augustine, still further to the south . . . ."
> Charles Lyell, Travels in North America in the Years 1841-1842 (New York, 1845) 1:123.

[4]"Public Records" MS., vol. 15, p. 38; vol. 16, p. 73.

[5]High ground commanded the fort on the west side and the Port

rebuilding the fallen fort, plans were made for an entirely new fortification.[1]

Besides its use in fortifications, tabby was also used in the construction of a church and a plantation house near Beaufort. The "old White Church," with ruins still visible on St. Helena Island, is believed to have been built about 1726 (Fig 20). Vestry records definitely attest to its existence by 1734.[2] The church was originally constructed as the Chapel of Ease to St. Helena Church in Beaufort, South Carolina. The first chapel was a sixty by forty foot structure with walls built entirely of tabby[3] (Fig. 21). Later it was enlarged and became a separate parish church.

The tabby house at Retreat Plantation was probably the first of its type around Beaufort. The two-story structure, built in 1738, may have been both the oldest all-tabby residence and the earliest example of two-story construction in the area.[4]

Royal River ran so close by the east side, that it dangerously undermined the fort. Ivers, pp. 66-67.

[1]See footnote 1 page 31 for discussion.

[2]'It is ordered that Mr. Jones go to St. Helena Island to perform services once in six weeks for six months.' "Minutes of the Vestry for St. Helena's Church, Beaufort, South Carolina, 1734."

[3]Water-rubbed brick, however, was used in the construction of arches for windows and doors. Either builders prefered not to employ tabby for this purpose or did not possess technical skills necessary for the construction.

[4]The main house at Retreat Plantation, however, can not be claimed as the oldest two-story tabby building in the Sea Islands for the two-story Horton House on Jekyll Island, Georgia, also constructed in 1738, equals it in antiquity.

Fig. 20. View of gabled end of the Old White Church (Chapel of Ease, St. Helena Island, South Carolina)

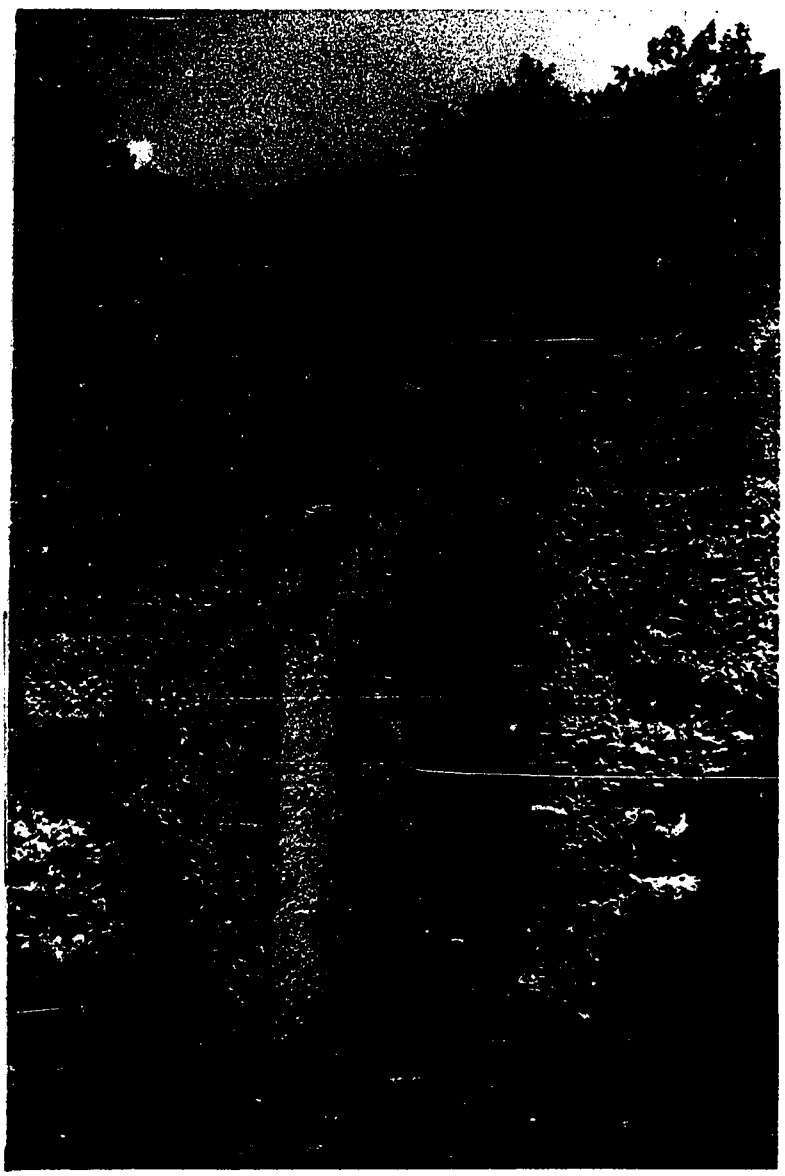

Fig. 21. Brick door arch at the Old White Church (St. Helena Island, South Carolina)

Tabby on the Georgia Coast (1736-1742)

The period from 1726-1742 was also marked by the growth of a second center of tabby construction north of St. Augustine. This secondary hearth appears to have been located on St. Simons Island, twelve miles from Bunswick, Georgia. The island, which contains the remnants of Oglethorpe's fortified settlement, Frederica, exhibits examples of tabby which have been dated to 1736.

Excavations of Frederica indicate that the oldest tabby on the island was probably that of the floors[1] and tabby walls of Davison House, constructed between 1736 and 1738.[2] Partial excavation of other houses has confirmed its usage elsewhere in the settlement[3] and established that tabby was regarded as a competitive material with brick for construction of foundations, walls, and floors.

The fort at Frederica may be counted as the largest assemblage of tabby structures on St. Simons Island (Fig. 22). Fort Frederica, constructed initially as an earthwork with supplementary wood and brick structures, was converted to a tabby fortification between 1740 and 1741.[4] The metamorphosis was due largely to the addition of

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[1]To date, the floors of the Davison House rank as the oldest examples of tabby floor construction in the British colonial realm.

[2]Charles H. Fairbanks, "The Excavation of the Hawkins-Davison Houses, Frederica National Monument, St. Simons Island, Georgia," The Georgia Historical Quarterly 40 (September 1956): 216, 223.

[3]William Thomson and John Lawrence, Jr. in a letter to the editor of London Magazine (June 1747); Fairbanks, pp. 224, 226.

[4]Albert C. Manucy, The Fort At Frederica, p. 15.

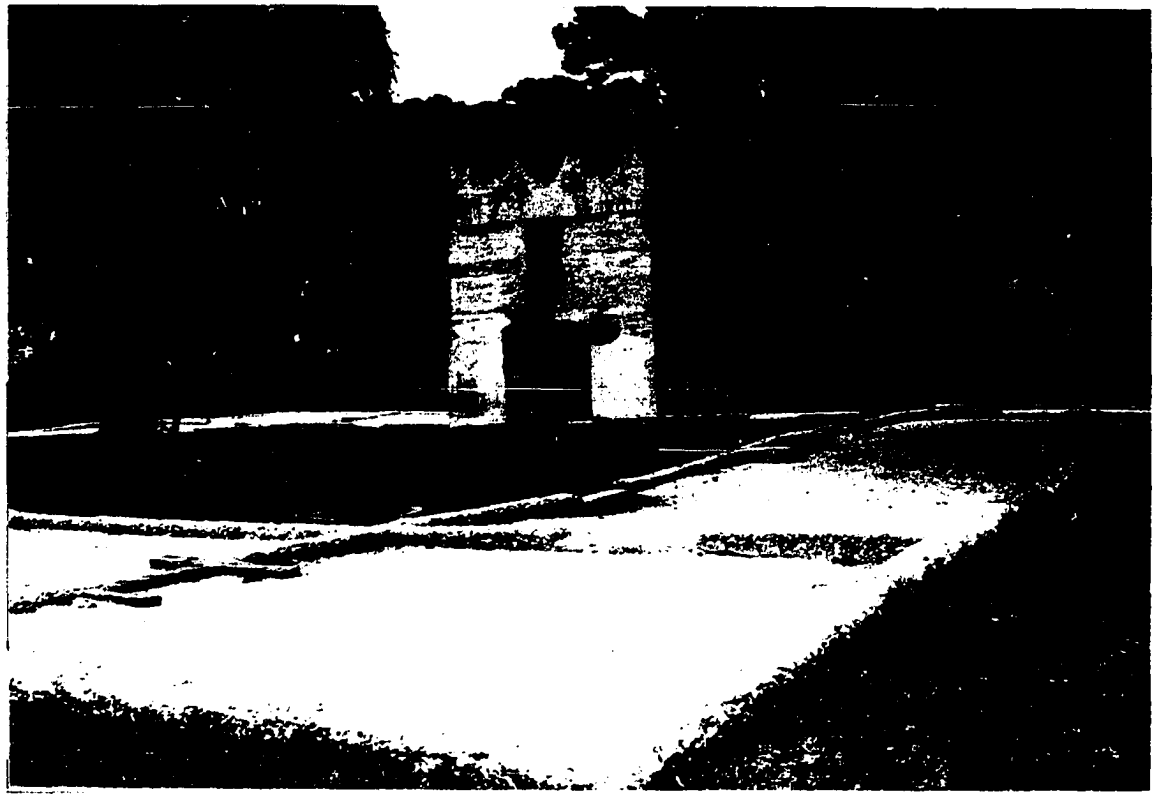

Fig. 22. Tabby foundations and the Barracks at Fort Frederica (St. Simons Island, Georgia)

breastheight tabby walls, designed to hold the innerslope of the earth parapets, and the King's magazine, a massive twenty by ninety-six foot building.[1] The conversion of the fort from earth to tabby was accomplished under the direction of General Oglethorpe and through the paid labors of both soldiers and settlers.[2]

The introduction of tabby and its subsequent establishment as a building material on the Georgia frontier warrants some explanation. It may be conjectured that the necessary skills for tabby construction were acquired by Oglethorpe and his Georgia settlers at Beaufort. It is a matter of record that General Oglethorpe and a ground of colonists stopped at Port Royal in 1732 en route to the southern territory.[3] A similar stop-over may have occurred in 1735. By that time, tabby's use around Beaufort was well established,[4] and examples of the construction may have been points of curiosity to visitors in the area. Certainly Oglethorpe would have had occasion to inspect the partially completed tabby fortress, Fort Prince Frederick, during this

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[1]Ibid, p. 16; A tabby barracks of comparative dimensions was constructed in the same period, but was located a short distance northeast of the fort and therefore, was not included as part of the fortification. Ibid, p. 77.

[2]Wages for work on the fort amounted to twelvepence per day. Ibid, p. 16.

[3]South Carolina Commons, House of Assembly, 1735.

[4]Neither documentary nor physical evidence confirms the use of tabby for floor construction in and around Beaufort. Yet the number of tabby floors discovered at Frederica suggests prior experience with the building technique. Logically such knowledge and experience would have to have been derived from on going tabby construction in the Beaufort area.

or other stays at Port Royal. The massive appearance of the fort, the relative low cost of construction, and the ready access to needed raw materials may have impressed Oglethorpe and suggested the suitability of the building material for the fort at St. Simons Island settlement.

Technical skills for tabby construction were taken to other sections of the Georgia coast during the years Frederica was under construction. The diffusion resulted from the movements of various officers in Oglethorpe's command.[1] For example, William Horton, a captain under Oglethorpe, was instructed to establish a military outpost on nearby Jekyll Island in 1736. In the course of his assignment, Horton, the first permanent resident of the Island, constructed two tabby buildings of considerable proportions: a two-story house (1738) and a large tabby brewery (Fig. 23).

In 1738, Mark Carr, another of Oglethorpe's officers, left St. Simons Island to set up a military outpost and plantation on the mainland. The location of Carr's plantation (some 500 acres) was on land now within the corpofate limits of Brunswick, Georgia. On this property Carr is thought to have constructed a house (of unknown material) and several tabby outbuildings.

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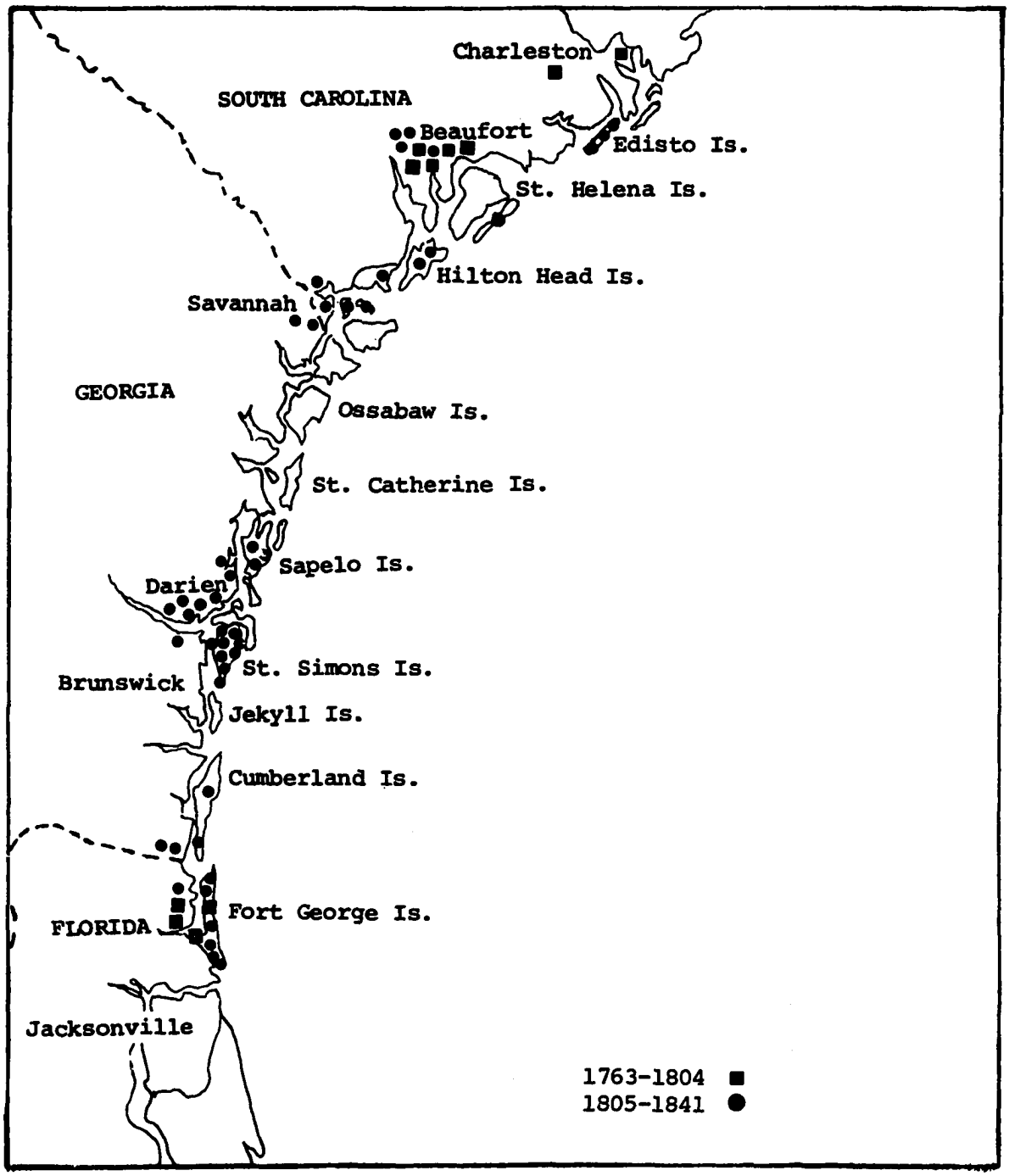
[1]Oglethorpe also was instrumental in the spread of tabby beyond the Frederica settlement. In 1738, a one and a half story tabby house, "Orange Hall," was constructed for General Oglethorpe on a fifty acre tract about a half mile east of Frederica. In 1771 this house was sold to James Spalding along with other property on the island. Thomas Spalding, born in Oglethorpe's house, attributed to it the early interest he acquired in tabby construction. Thomas Spalding, "On the Mode of Construction of Tabby Buildings, and the Propriety of Improving Our Plantations in a Permanent Manner," The Southern Agriculturist (December, 1830): 618.



Map 3. Tabby Construction of British and American Origin from 1763 to 1841

Fig. 23. Two-story Horton House, built ca. 1738 (Jekyll Island, Georgia)

Three years later, tabby construction spread northward to the Isle of Hope (ten miles southeast of Savannah, Georgia). In 1741, Lieutenant Noble Jones had a small company assigned by General Oglethorpe to guard the Narrows of the Skidaway River replaced the original wooden fort of the narrows with a tabby fortification which was given the name Fort Wimberly[1] (Fig. 24). In addition, Jones employed tabby in the foundation of his own residence, Wormsloe, likewise on the Isle of Hope.[2]

Written accounts have linked William Horton and Mark Carr directly to Frederica and hence, to ongoing tabby construction at the settlement. The Egmont Diary placed William Horton on St. Simons Island in 1736. The diary noted:

> . . . that there are settled there [Frederica] about 60 to 80 families besides single men, . . . and that there are two streets laid out, on each side of which 15 or 16 houses are already erected; that Mr. Horton has the general inspection of the place . . . . December 11, 1736.[3]

According to colonial land records, Mark Carr held property at Frederica. A partial archaeological excavation of Carr's lot (Lot 1 -

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[1]Fort Wimberly was approximately thirty feet square with wall heights of eight feet or less. The bastions extending from each corner and the powder chamber were probably roofed over, while the remainder of the enclosure was left open. James A. Ford, "An Archaeological Report of the Elizafield Ruins," in Georgia's Disputed Ruins (Chapel Hill, North Carolina: University of North Carolina Press, 1937), p. 217. (E. M. Coulter, editor).

[2]Robert Preston Brooks, "Wormsloe House and Its Masters," The Georgia Historical Quarterly, 40 (June, 1956): 144-151; E. M. Coulter and A. B. Saye, eds., A List of the Early Settlers of Georgia (Athens, Georgia; University of Georgia Press, 1949), p. 26, entry 735.

[3]Egmont, Manuscripts of the Earl of Egmont, Diary of Viscount Percival, Afterwards First Earl of Egmont (London: H. M. Stationary Office, 1922) 2: 316.

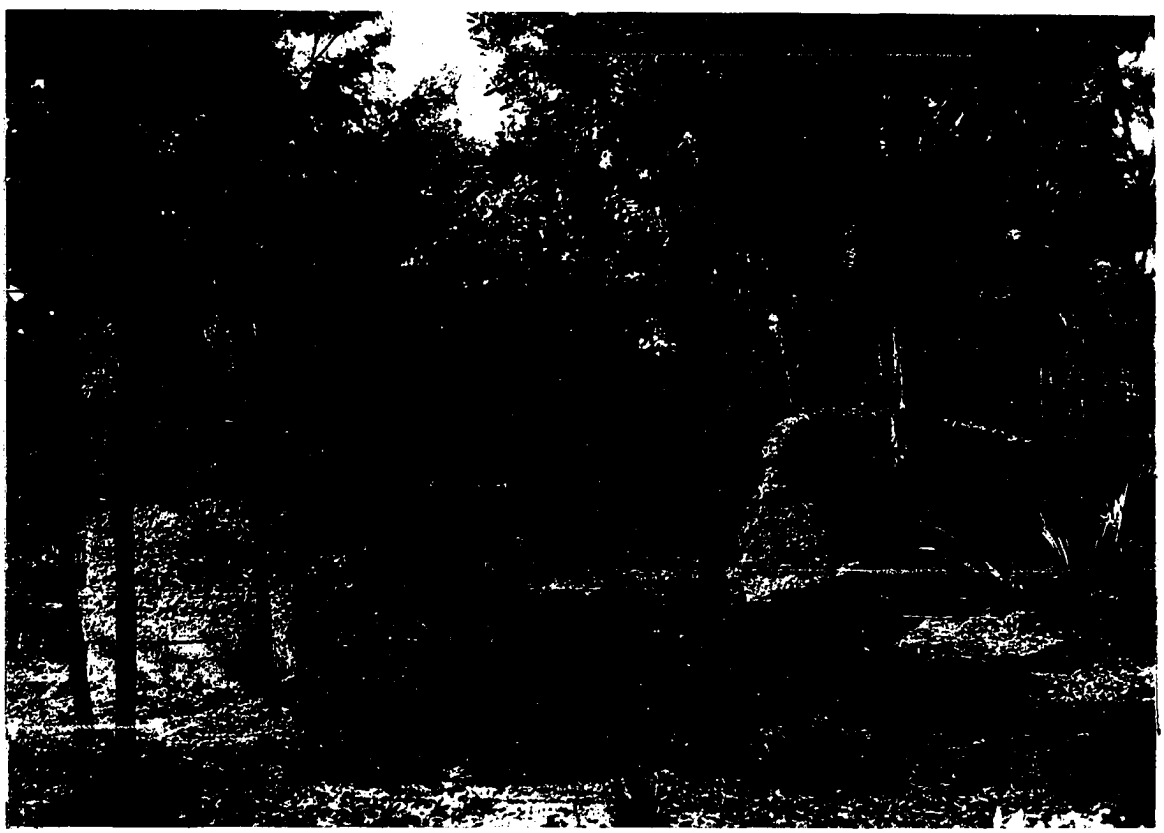

Fig. 24. Remains of Fort Wymberly- west side (Wormsloe, Isle of Hope, Georgia). From the collection of the Library of Congress

Northward) has uncovered the front or south wall of a tabby-built house.[1] No records have been discovered, however, that provide any information about this building, or directly associate Carr with its construction. The documentary evidence clearly places Carr and Horton on St. Simons Island during the years of the Frederica settlement. At the settlement the two men presumably acquired the skills for tabby construction later employed at their assigned outposts. This marked the beginning of St. Simon's function as a center for the diffusion of tabby along the Georgia-Florida coast.

Tabby in South Carolina and Georgia (1742-1762)

By 1742, tabby material and construction techniques were well established in two locales within the British provinces (identified as Charleston-Beaufort in South Carolina and St. Simons Island in Georgia). Between 1742 and 1762 the material and associated building methods diffused slowly from these centers to nearby islands and adjacent coastal areas. Keynoting this period was the notable diversity in the application of the construction material. An inventory of tabby building for the period includes:

(1) Forts (2): Fort Lyttelton and Fort Sunbury (the latter never completed)[2]

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[1]Fairbanks, p. 227.

[2]Fort Lyttelton on Port Royal Island, South Carolina was constructed between 1758 and 1762. Miligan's narrative account, written in 1763, contained the following description of the fort.

> "The harbour is defended by a small fort lately built of tappy, a cement composed of oyster shells beat small with a mixture of lime and water, and is very durable. The fort has two demi-bastions to the river, and one bastion to theland with a gate and ditch; the barracks are very good and will lodge one hundred men with their officers; there are in it sixteen

(2) The Hornwork in Charleston[1]

(3) A house, all-tabby[2]

(4) Foundations

(5) Chimneys

(6) Outbuildings (viz. slave quarters, barns, store houses)[3]

(7) Walls (garden enclosures)

(8) Burial vaults[4]

(9) Walkways[5]

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weighty cannon, not yet mounted, the platforms and parapet wall not being finished for want of money." Miligan, Short Description of the Province of South Carolina (1763). The existence of Fort Sunbury is known only from colonial records. Located in Sunbury, Georgia, eleven miles east of Midway, it is believed to have been situated on land owned by Captain Mark Carr, formerly an officer with General Oglethorpe. The records indicate work on the fort was begun in 1756. Reference again was made to it in 1762 in A. D. Candler, ed., Colonial Records of the State of Georgia (Atlanta, Georgia: C. P. Boyd, State Printer, 1904-1925) 13: 723. Fort Sunbury, however, was never completed and Fort Morris was built on its site in 1777. Paul McIlvaine, The Dead Town of Sunbury (Groves Printing Co., Asheville, North Carolina, 1971), p.36.

[1]The tabby hornwork, a fortress built on both sides of the city gate, which was then located at King Street, served as part of Charleston's Revolutionary War defenses. The hornwork was begun in 1757 under the direction of William Gerhard Debrahm, but was completed just prior to the American Revolution. A Short Description of the Province of Carolina, 1770, "South Carolina Public Records" MS. vol. 32, pp. 386-287.

[2]The middle section of the all-tabby Datha House, Datha Island, South Carolina has been dated to 1760.

[3]McIlvaine cites the use of tabby foundations, chimneys and outbuildings in Sunbury, Georgia during this period. McIlvaine, p.39

[4]Christ Church Cemetery, St. Simons Island, Georgia.

[5]Colonial Cemetery, Savannah, Georgia.

Decline of Tabby in Georgia (1763-1804)

During the last three and a half decades of the eighteenth century, there were marked changes in tabby's distributional pattern (Map 3). While tabby maintained its popularity in and around Beaufort, its use was discontinued on the Georgia coast. Examples of tabby construction in Beaufort for this period included three large tabby houses: "The Tabby Manse" (1786-1788), the Barnwell-Gough House (1789), the main house at the Woodward Plantation, several foundations,[1] Fort Dorchester,[2] and the Beaufort Arsenal.[3] No new tabby construction however, was reported for the Georgia coast. Termination of its use in that locale appears to have been the indirect result of the abandonment of the fort and settlement at Frederica. With the defeat accompanying the Spanish invasion in 1742, Fort Frederica had served its purpose. In 1748, peace was made with Spain in the Treaty of Aix-la-Chapelle and the regiment of British soldiers at the fort disbanded the following year. With the regiment gone, the town of Frederica began to lose population. In 1758, a ruinous fire destroyed most of its

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[1]The Verdier House (ca. 1790) and the William Elliot House also from the late eighteenth century were constructed with elevated tabby basements. National Registry of Historic Places (1971).

[2]Fort Dorchester, South Carolina, located on the left bank of the Ashley River, six miles southwest of Summerville was constructed in the late 1760s (ca. 1767). The plan was that of a square redoubt with half-bastions at each of the four angles. The magazine and other buildings at the fort were constructed of ceramic brick, while the parapet or enclosing wall was of tabby. Henry Smith, "The Town of Dorchester," South Carolina Historical and Genealogical Magazine (April 1905): 62, 90-91; "Letter from John Johnson, Charleston, South Carolina, May 1905," South Carolina Historical and Genealogical Magazine (May, 1905): 128; "Note to the Editor from Henry Smith, June, 1905," South Carolina Historical and Genealogical Magazine (June, 1905): 180.

[3]See footnote 2 page 78.

buildings and by 1763 the town was completely abandoned.[1]

Though the coastal section of Georgia gained population up to and after the American Revolution, the newcomers did not acquire the skills of tabby construction. Frederica residents, the logical purveyors of the trait, had either returned to England, moved to Charleston[2] or Savannah,[3] or had acquired property elsewhere along the coast. With the demise of the center of diffusion, the numbers of tabby structures declined drastically. In fact, 1762 was the last year that tabby was used in construction on the Georgia coast until it was reintroduced in the early nineteenth century.

To conclude the consideration of eighteenth century tabby housing, mention must be made of British-American construction on the Florida sea islands. In 1791, Spain awarded Fort George Island to John McQueen, a plantation owner from Glynn County, Georgia.[4] McQueen's house, built between 1797 and 1798,[5] was the first of a number of tabby buildings on the island and one of the first constructed

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[1]Margaret Davis Cate, "The Original Houses of Frederica, Georgia: The Hawkins-Davison Houses," The Georgia Historical Quarterly 40 (September, 1956): 204.

[2]Ibid, p. 207.

[3]Coulter and Saye, eds., p.233, 237.

[4]Dena Snodgrass, "Fort George Island: Part II - The Three Scotsmen," Papers of the Jacksonville Historical Society, (1969) 5: 79-80.

[5]"John McQueen, Jr. to Eliza Anne McQueen, Fort George, 11th March, 1798," The Letters of Don Juan McQueen to His Family, Written from Spanish East Florida, 1791-1807 (Columbia, South Carolina: Bostick and Thornley, 1943), p. 45. (Hartridge, ed.)

of tabby brick in the Southeast. The Spanish-style residence was a two-story tabby and wood structure. Three walls of the lower story were of tabby brick, while the fourth was a combination of tabby brick and layered tabby construction. In the style of the Spanish-built houses in St. Augustine, the upper or second story was constructed of wood.[1]

Other uses of tabby on Fort George Island in the eighteenth century are currently being investigated. A recent historical and archaeological survey of the island disclosed remnants of a tabby mill,[2] which may date to the period of McQueen's ownership of the island. L. Scott Nidy, survey archaeologist, believes the site could be that of the water powered cotton gin, constructed by McQueen ca. 1801.[3]

Additional examples of eighteenth century tabby construction have been located at the site of the former Cedar Point Plantation, on the north bank of the St. Johns River, six miles west of Fort George Island. Examples of tabby at Cedar Point include what is left of a two-story, all-brick plantation house and several tabby brick outbuildings.[4]

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[1]Field Notes, April 1973; Manucy, Houses of St. Augustine, p. 76.

[2]L. Scott Nidy, "An Archaeological and Historical Survey of the Rheinhold Property on Fort George Island, Duval County, Florida," Miscellaneous Project Report Series No. 12 (February, 1974): 11.

[3]"My Crop of cotton turned out but short and I lost so much time putting [sic] up a water gin to clear it that I have not gined out a thousand weight of cotton . . . it is now finished but not able to work until we get rain to fill my dams . . . ." "John McQueen to Eliza Anne MacKay, January 20, 1801," The Letters of Don Juan McQueen, p. 56.

[4]Dena Snodgrass, "Cedar Point Revisited," Papers of the Jacksonville Historical Society, 5: 34-35.

Extensive use of tabby brick and the age of the structures are the outstanding features of this collection of tabby. Lack of documentary materials makes it difficult to date the construction at Cedar Point. Dena Snodgrass, a Duval County historian, considers the structure at Cedar Point to be contemporary to those at the McQueen Plantation on Fort George Island, but wisely refrains from identifying the site with the older buildings, that is the site with the older tabby brick.[1] Period documents (e.g., letters, diaries, etc.) offer few clues. Both McQueen and Fitzpatrick, owners of the two plantations, claimed prior residence on the Georgia coast and therefore had the opportunity of acquiring information on tabby building. One of the two men later introduced the material and construction at his East Florida plantation. From this usage, knowledge of the building mode was disseminated to neighboring estates.

It is not known precisely where tabby brick construction originated. Its development might have taken place on one of the two Florida plantations or more likely, on the Georgia coast and from there implanted in the Florida sea islands. Whichever the case may have been, the result was the same -- a strong regional preference for tabby brick as opposed to other types of tabby construction.

The Revival of Tabby in Georgia and Its Expanded Distribution in South Carolina and Florida (1805-1842).

At the beginning of the nineteenth century, tabby construction was a viable building mode only in and around Beaufort, South Carolina. In the four decades that followed the pattern of tabby's distribution

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[2]Snodgrass, p. 30.

underwent radical alteration. The resultant pattern can be largely attributed to the reintroduction of the construction in Georgia and the expanded use of the building material in South Carolina and Florida.

Between 1805 and 1842, tabby construction underwent a revival in Georgia. In 1805, Thomas Spalding, a Georgia plantation owner, began construction of an all-tabby house on Sapelo Island, ten miles northeast of Darien, Georgia. The house was completed ca. 1812 and so marked the beginning of the nineteenth century revival of tabby building. In an article appearing in the 1830 Southern Agriculturist, Thomas Spalding explained the way in which he became acquainted with tabby construction.

> I was born in the old town of Frederica, in one of these Tabby houses; I had seen time destroy everything but them: I had seen them even sawed up into blocks, like a mass of living stone; and of such blocks, carried from Frederica, are the three first stories of the lighthouse built at St. Simon's. The coating of plaster, which covered these houses, having fallen off, the walls exhibited the manner in which they were constructed, as well as the materials, so distinctly, that there was no difficulty in following the example . . . .[1]

Spalding followed the construction of his house on Sapelo Island with several tabby outbuildings and a tabby sugarhouse. On the mainland, just east of Darien, Georgia, he built a large tabby plantation house, known as Ashantilly (1815) (Fig. 25). Once these buildings had been constructed, the building technique began to spread to neighboring plantations and to the nearby town of Darien. Spalding provided further impetus to the diffusion of tabby through local promotion and published writings. Following his experience with tabby on Sapelo Island and at Darien, Spalding was so enthusiastic as to the benefits

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[1]Spalding, "Mode of Construction of Tabby Buildings," p. 618; Also see footnote page 90.

Fig. 25. Ashantilly Plantation house, built ca. 1815 (near Darien, Georgia) in 1936 photograph. From the collection of the Library of Congress

of the construction material for coastal plantations that he actively promoted tabby building through papers read before the St. Simon agricultural society,[1] and through his aforementioned highly definitive article on the subject in the Southern Agriculturist (1830).[2] By 1842 a number of tabby structures had been built on Georgia plantations between Darien and St. Marys. An inventory of tabby construction for this period includes four sugarhouses,[3] a distillery,[4] a chapel,[5] five plantation houses,[6] various plantation outbuildings (slave quarters,

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[1]The Agricultural and Sporting Club of St. Simons Island.

[2]Spalding, "Mode of Construction of Tabby Buildings," pp. 617-624.

[3]a) The sugarhouse on Barn Creek, Sapelo Island, Georgia was built by Thomas Spalding around 1814.

b) "The Thicket": sugar mill, rum distillery, and tabby storage buildings (an assemblage of eight buildings), located on Carnochan Creek, two miles northeast of Ridgeville, Georgia, was constructed in 1816 by William Carnochan, friend and neighbor of Thomas Spalding. The octagonal mill closely followed plans outlined by Spalding in his essay "Observations and the Method of Planting and Cultivating Sugar Cane in Georgia and South Carolina," in Georgia's Disputed Ruins (Chapel Hill, North Carolina Press, 1937), pp. 230-252.

c) The sugarhouse on the Elizafield Plantation (now Boy's Estate), two miles south of the Altamaha River near Darien, Georgia, has been dated to the early nineteenth century. The design and construction of the mill building closely resembles the Carnochan sugarhouse at "The Thicket." James Ford, "An Archaeological Report on the Elizafield Ruins," in Georgia's Disputed Ruins (1937), pp. 208-213.

d) The McIntosh sugarhouse on Canaan Plantation, two miles northwest of St. Marys, Georgia, reportedly was built by John Houstoun McIntosh about 1826. In this sugarhouse McIntosh installed what was according to Thomas Spalding the first horizontal cane mill worked by cattle power. The mill continued in use until after the Civil War. During the war, both sugar and arrowroot starch were produced in the sugarhouse. Ford, pp. 213-216.

[4]See discussion on "The Thicket" in footnote 3-b.

[5]The Hazzard Chapel, West Point Plantation, St. Simons Island, Georgia.

[6]a) The main house, Spalding Plantation, Sapelo Island, Georgia,

slave hospitals, milk houses, and barns),[1] chimneys,[2] burial vaults,[3] a hotel,[4] and several warehouses.[5] The quantity of tabby and its demonstrated diversity clearly attested to the effectiveness of Spalding's efforts to reintroduce tabby into Georgia in the nineteenth century.

Concurrent with tabby's renewed popularity in Georgia was its diffusion along the South Carolina and Florida coast. Tabby building in South Carolina and Florida, like Georgia, was associated primarily

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built between 1805 and 1812.

b) "Ashantilly," a two-story plantation house, east of Darien, Georgia, built ca. 1815.

c) The main house, Hamilton Plantation, St. Simons Island, Georgia, constructed in the early nineteenth century.

d) "Dungeness," a three-story tabby house, at the south end of Cumberland Island, Georgia, also built in the early nineteenth century.

e) Tabby house at Blue and Hall's Landing, near Darien, Georgia, built about 1815.

[1]Remnants of tabby outbuildings are prominent cultural features on St. Simons Island, Sapelo Island, and Cumberland Island, Georgia.

[2]A photograph, taken in 1936, records a tabby chimney on a slave cabin on the former West Point Plantation, St. Simons Island, Georgia.

[3]The Hazzard Vault (ca. 1813), Christ Church Cemetery, St. Simons Island, Georgia, is one example of a tabby burial vault from this period.

[4]The tabby hotel, warehouses and store foundations in Darien, Georgia, were constructed about 1815 by Roswell King, a local builder. King had been previously employed by Thomas Spalding to finish the woodwork on the tabby house on Sapelo Island. From this contact, King acquired his knowledge of tabby construction. He then proceeded to build his own house (at Blue and Hall's Landing) from this material, the slave quarters at Butler Point (St. Simons Island), and the above mentioned structures in the town of Darien. Marmaduke Floyd, "Certain Tabby Ruins on the Georgia Coast," in Georgia's Disputed Ruins (1937), 77; Margaret Davis Cate, Early Days of Coastal Georgia (Fort Frederica Association, 1955), p. 59.

[5]See footnote 4 for discussion.

with plantations. The spread of tabby in this period largely coincided with the establishment of new plantations on the islands and adjacent areas of the South Carolina and north Florida coast. In South Carolina, tabby construction dating to the period between 1805 and 1842, has been discovered at formed plantation sites on Edisto Island, St. Helana Island, Fripps Island, Spring Island, Callawassie Island, Daufuskie Island, and Hilton Head. Other than the Edisto Island plantations, the plantations were all located within twenty miles of Beaufort, a active center of tabby construction in the early nineteenth century. Most likely island planters acquired their knowledge of the construction directly from the tabby at Beaufort. A few planters, however, may have had contact with the Georgia coast and been influenced by the building activities at Sapelo Island, Darien and St. Simons Island, Georgia.

On the Florida coast, examples of tabby from the early nineteenth century have been found at former plantations on two islands: Amelia[1] and Fort George. The collection of tabby buildings on the latter is exceptionally interesting. The Kingsley Plantation on Fort George Island is the site of some twenty-eight separate buildings, constructed wholly or partially of tabby material. The construction dates assigned to these buildings range from 1798 to approximately 1830. During this thirty-two year period the island plantation had three separate owners:

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[1]Wallace McHarg Roberts and Todd: Architects, Landscape Architects, Urban and Ecological Planners, "A Report on the Master Planning Process for a New Recreational Community: Amelia Island, Florida," (Philadelphia, 1972), p. 32.

John McQueen,[1] John Houstoun McIntosh, and Zephaniah Kingsley, Jr.[2] While all three owners appear to have contributed to tabby buildings on the island,[3] the predominant construction took place during the Kingsley era (1817-1830). The outstanding use of the building material was for the construction of slave housing in the mid-1820s. The remnants of some twenty-four cabins, constructed by Kingsley, are still visible on Fort George Island (Fig. 26).

Besides the numbers of structures, the tabby buildings on the island are remarkable for the construction techniques exhibited. Buildings from the nineteenth century, were constructed of both layered tabby and tabby brick. Layered construction was employed in walls of the slave cabins, the McGundo House,[4] half of the barn-carriage

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[1]See pages 40-41 for additional biographical information on John McQueen; See also Snodgrass, pp. 79-80.

[2]Snodgrass, pp. 80-86.

[3]No record exists relating to the possible contributions of the second of the three owners, John Houstoun McIntosh, to tabby housing on the island. Yet judging from his later activities (i.e., the construction of the tabby sugarworks at New Canaan Plantation, St. Marys, Georgia, (see footnote 3-d on page), it is likely that McIntosh played some role in the construction of the tabby buildings on the Fort George Island plantation--possibly the barn-carriage house, or even the main plantation house, which as a foundation of both tabby and red brick. While the latter structure is more often attributed to Kingsley, documentary evidence is inconclusive on this point. In addition to these buildings, several local historians credit the construction of the two, still unidentified, tabby brick crypts to the McIntosh era. Snodgrass, p. 81; Nidy, pp. 19-20.

[4]The McGundo House was possibly the last tabby building constructed on Fort George Island. It is assumed to have been built immediately prior to 1830, when it was formerly named by Kingsley the Munsila McGundo House.

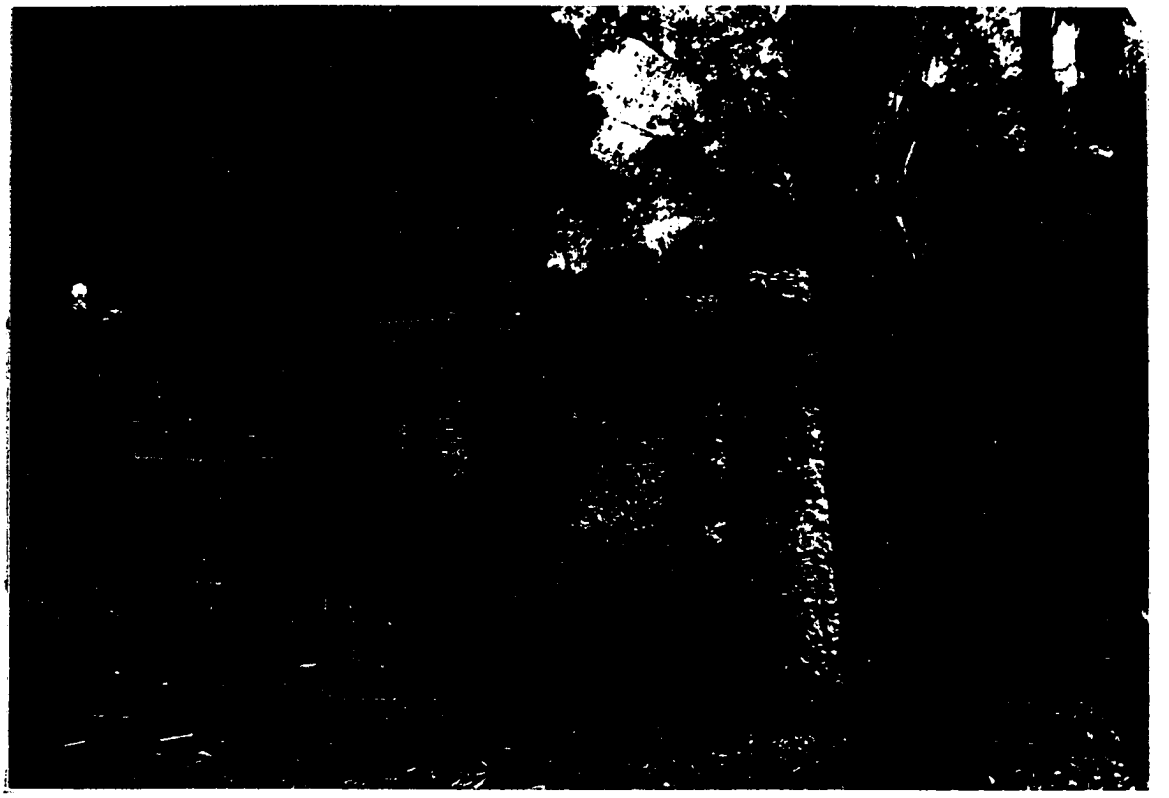

Fig. 26. Remnants of tabby slave quarters at Kingsley Plantation (Fort George Island, Florida)

Fig. 27. The McGundo House, built ca. 1831 at Kingsley Plantation (Fort George Island, Florida)

house, a retaining wall, and in the plantation gristmill[1] (Fig. 27). Tabby brick was used to some extent for floors and window casings in Kingsley's slave housing, for part of the foundation of the main house and for half of the barn-carriage house[2] (Fig. 28).

In view of the number of tabby buildings constructed on the coastal plantations, the years from 1805 to 1842 could be reasonably termed "the plantation era" in the history of tabby construction. This label, however, is applied only with the understanding that it does not negate the use of tabby for other purposes in this period.

During the War of 1812, tabby was used in several instances in the construction of military fortifications. Examples include a tabby-built Martello tower on Tybee Island (twelve miles east of Savannah)[3] and a small fort on Stono Inlet (ten miles northeast of Savannah on the north side of the Savannah River), both of which served in the defenses of the city of Savannah during the period of hostilities.

Other employments of tabby construction during this era were for residences, commercial establishments, and public works in the

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[1]A circular tabby foundation is all that remains of the plantation mill. The distance from water, as well as the circular shape of the foundation, would seem to indicate that the mill was wind driven rather than water powered. Nidy, p. 12.

[2]Janet H. Gritzner and Charles F. Gritzner, "A Report on Tabby Construction With Emphasis on the Kingsley Plantation, Fort George Island," An unpublished manuscript prepared for the Jacksonville Area Planning Board, 1974.

[3]A Martello tower was a type of fortified tower, which served as outworks to a main fortification.

Fig. 28. Barn-carriage house at Kingsley Plantation (Fort George Island, Florida)

towns of Beaufort, South Carolina, Darien, Georgia, and in the city of Savannah. An enumeration of tabby structures built between 1805 and 1842 includes two townhouses[1] and a seawall in Beaufort; a hotel, several warehouses, and store foundations in Darien;[2] and a public walkway and one or more garden enclosures in Savannah.[3]

The Decline of Tabby Construction on the Sea Islands and Its Spread to the Florida Gulf Coast (1842-1859)

By the year 1842, the tabby mode of construction was well represented in the coastal zone, extending from Beaufort, South Carolina to Jacksonville, Florida. In the sixteen years that followed notably fewer new tabby buildings were constructed within this distribution area (see Map 3). Tabby construction for this period included the foundation of two plantation houses and a parsonage of Edisto Island, South Carolina, the main house at Hopeton Plantation near Darien, Georgia, a well base and outdoor oven on Edisto Island, and the outbuildings of the Sams-Crofut House in Beaufort. The period of plantation expansion on the sea islands was over. The decline in construction of tabby buildings generally coincided with the decline of all types of construction.

The period between 1842 and 1859 also was marked by the introduction of tabby to the Manatee River section of Florida's west

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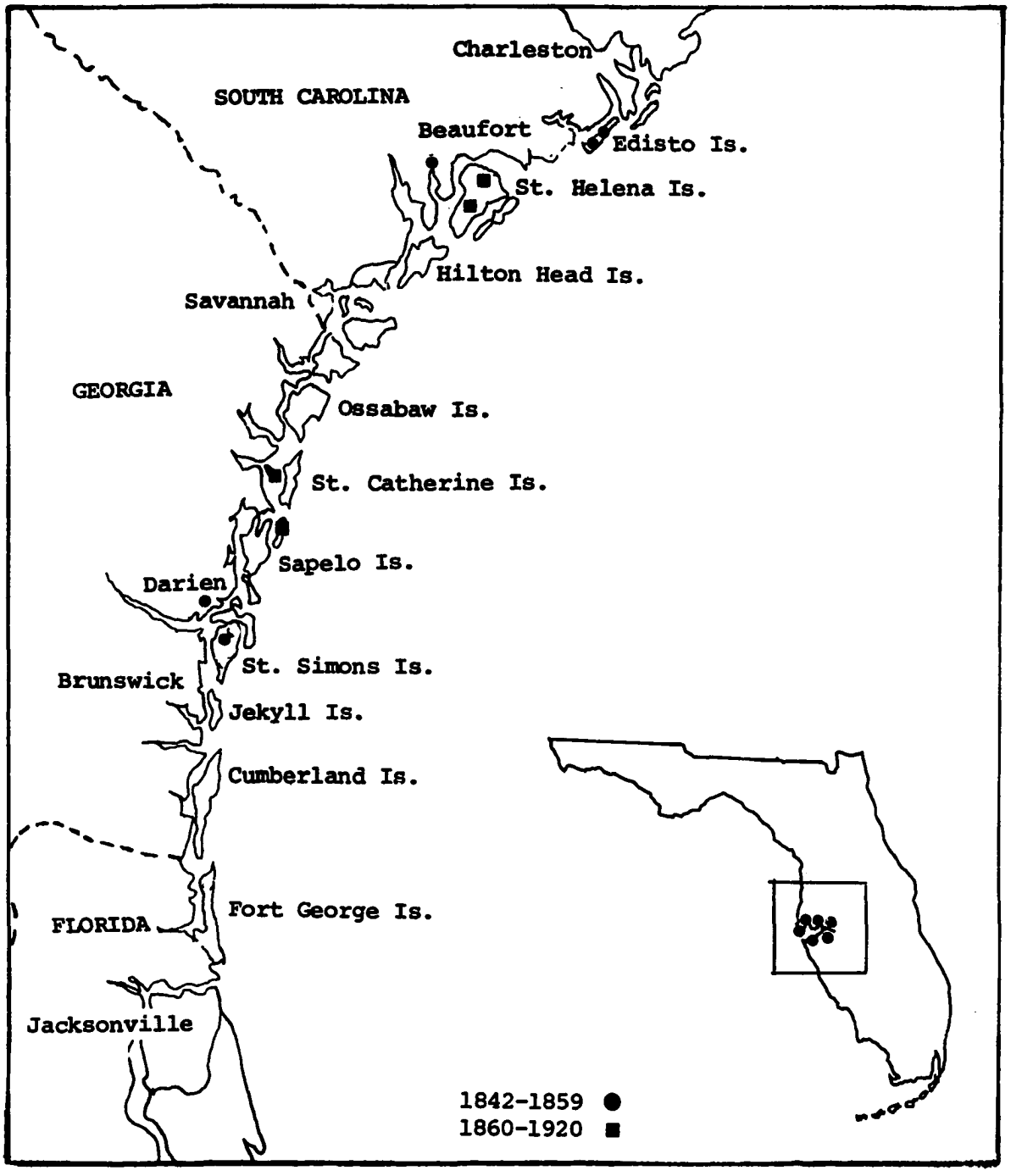
[1]The Frederick Fraser House (1805); Thomas Talbird House (1820).

[2]See footnote 4 page 104.

[3]The basement of the Owen-Thomas House, built between 1816 and 1819, and the walls enclosing the garden area to the back were both of tabby construction. Some authorities believe the tabby basement is of an earlier date than the house itself, possibly belonging to the DeBrahm House, which occupied the site in the late eighteenth century.



Map 4. Tabby Construction of American Origin from 1842 to 1920

coast. The close of the second Seminole War in 1842 opened the Manatee country for permanent settlement. In 1845, construction was begun on the Braden Castle, an immense all-tabby residence, located on the south bank of the Manatee River at its confluence with the Braden River. The Castle, built as a fortified residence,[1] was completed in 1851 and occupied by Dr. Joseph Braden, its builder and his hiers until 1880. After this date the structure was abandoned and allowed to go to ruin. Figure 29, 30, and 31 photographs of the Braden Castle, show the layered construction of the tabby residence and depict its deterioration from 1890 to about 1940. A recent visit to the castle showed the structure to be in an advanced state of decay with only a small portion of the original building remaining. The chimneys of the castle, which appear in the photographs taken in 1890 and in 1907 (Figs. 29 and 30), possibly were tabby brick or a combination of red brick and tabby brick. Brick of the latter type has been found on the grounds of the Braden Castle. The proximity of the tabby brick to the plantation house suggests its use in the structure, most likely in the chimneys of the residence, which had either fallen down or been dismantled prior to the 1940 photograph.

While the Braden Castle was the first and largest of the tabby buildings in the Manatee River region, the castle was by no means the only example of tabby in the area. Robert Gamble, a planter from Leon

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[1]The tabby walls of the Braden Castle were fourteen to twenty inches thick, a measurement which exceeded Spalding's recommended fourteen-inch walls for the first story and ten-inch walls for the second, and largely accounted for the fortress-like appearance of the castle. Charles A. Hazen, personal correspondence, October 1974, p. 1; Field Notes, September 1975.

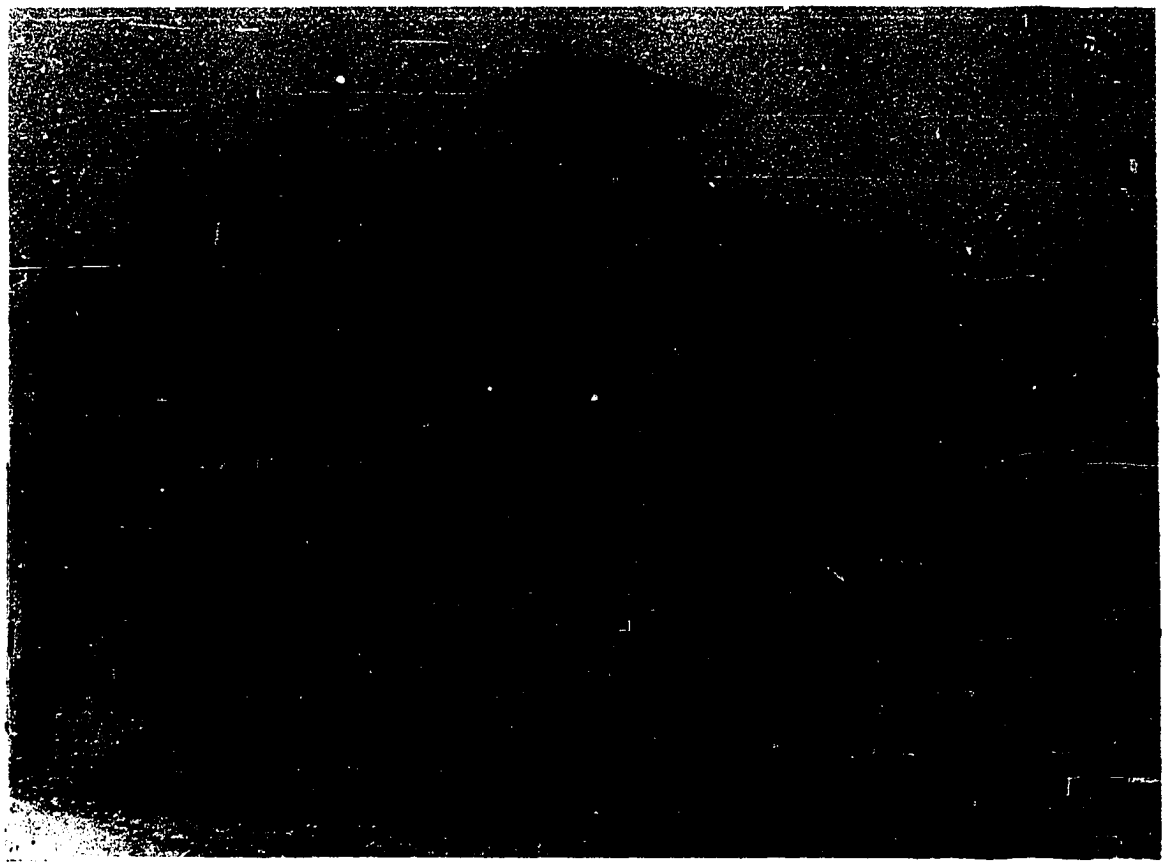

Fig. 29. Braden Castle, front view, in 1900-03 photograph (Bradenton, Florida). From the collection of the Manatee County Historical Society

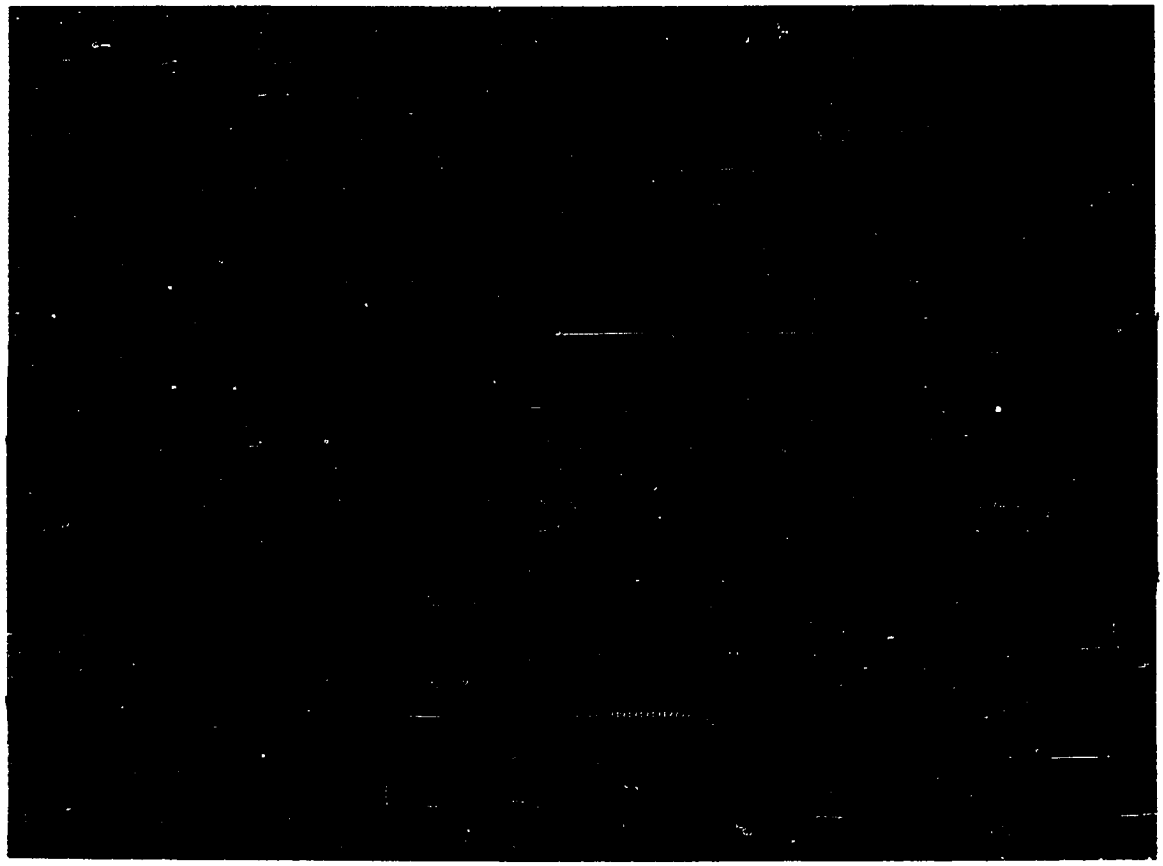

Fig. 30. Braden Castle, back view, in March 1907 photograph (Bradenton, Florida). From the collection of the Manatee County Historical Society

Fig. 31. Braden Castle, front view, in 1940s photograph (Bradenton, Florida). From the collection of the Manatee County Historical Society

County, Florida, made extensive use of the building material on his Manatee plantation.[1] The two-story main house of the Gamble Plantation, built in the late-1840s, was a combination of imported red ceramic brick and locally made tabby brick[2] (Fig. 32). Whereas the walls of the front section of the plantation house were red brick, the older rear section and the mansion's eighteen columns were largely composed of tabby brick. Unlike the rectangular brick in the wall sections of the house, the tabby brick in the eighteen-inch diameter pillars were made in three-inch high triangular molds. Similar to sections of a pie, the bricks could be fitted together to produce the desired cylindrical form.

Other uses of tabby brick at the Gamble Plantation included the construction of a sugar mill[3] and four twelve by thirty-two foot barbeque pits. While the cooking pits, possibly part of a smokehouse, remain intact, there is no trace of the sugar mill at the plantation site. The form and construction of the mill is known only from a sketch of the structure dated about 1887 or 1888 (Fig. 34). The mill as depicted in the drawing must have been a sizable structure, easily the largest building ever constructed of tabby brick in the Southeast.

Clearly the outstanding feature of the Gamble Plantation was the extensive use of tabby brick. Yet the traditional layered method of

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[1]Also the prior residence of Joseph Braden.

[2]Manatee historians believe the mansion at Bradenton replicated the Gamble home in Leon County, differing only in that tabby brick was substituted for red brick in portions of the structure. Lillie McDuffee, The Lures of Manatee (Nashville: Marshall and Bruce Co., 1933) p. 35.

[3]Ibid.

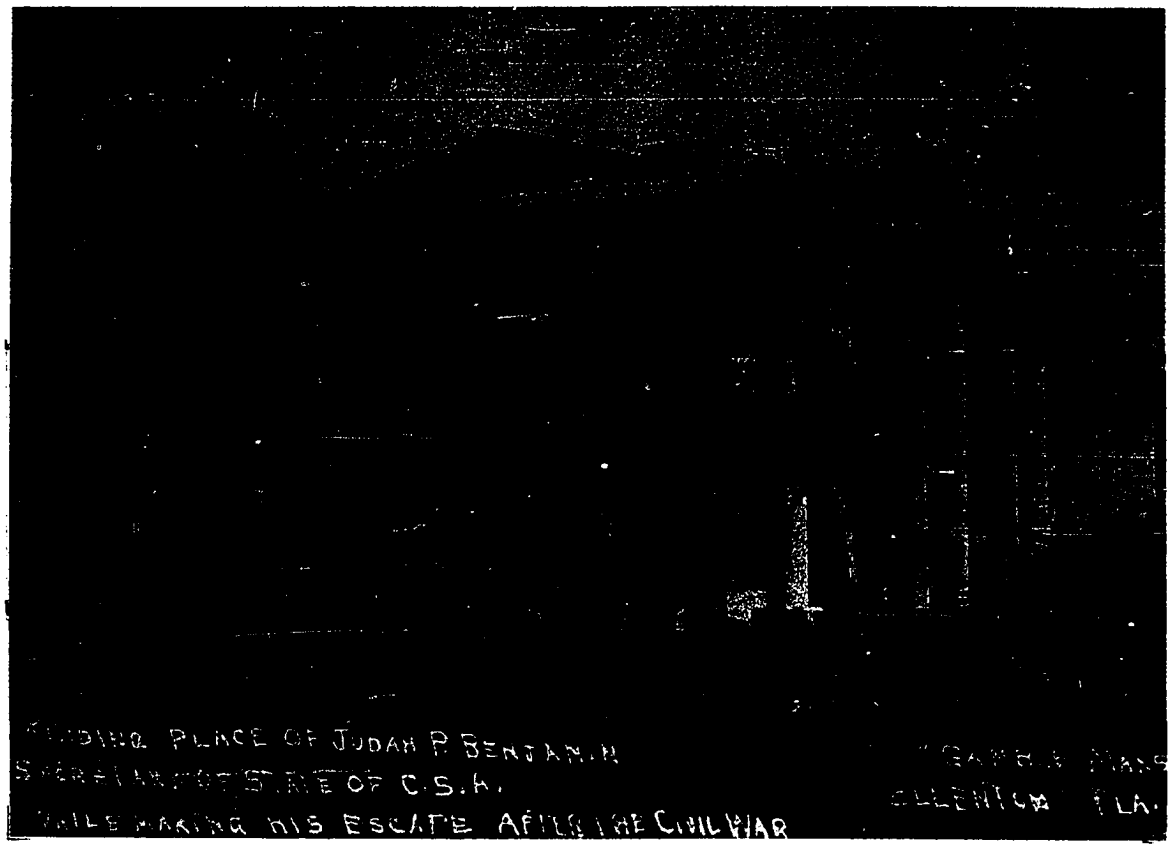

Fig. 32. Gamble Mansion in 1910/20 photograph before restoration (Ellenton, Florida). From the collection of the Manatee County Historical Society

Fig. 33. Tabby well and cistern, restored, at Gamble Mansion (Ellenton, Florida)

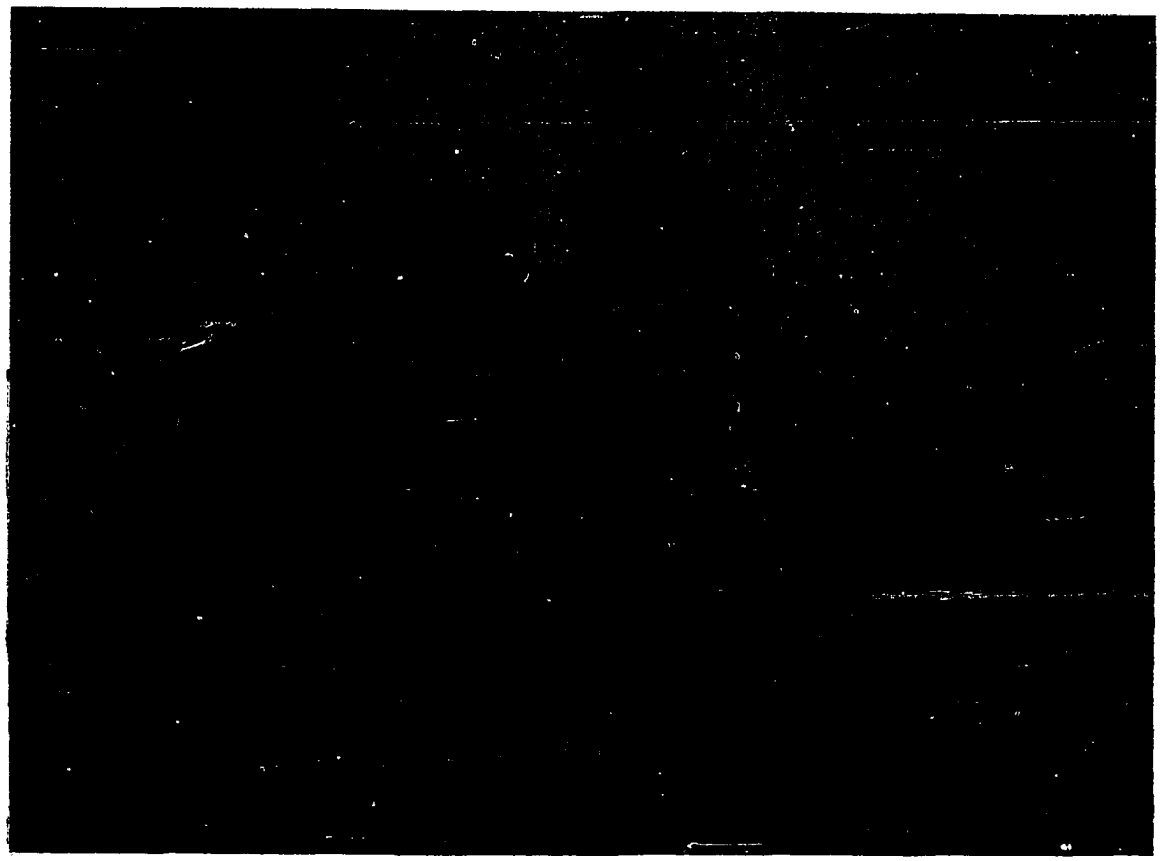

Fig. 34. Photocopy of 1887/88 sketch of Gamble sugar mill from the sketch book of Mrs. R. S. (Anna Webb) Griffith (on former Gamble Plantation, Ellenton, Florida). From the collection of the Manatee County Historical Society.

tabby construction was also represented at the plantation, exemplified in the fifteen by thirty-six foot covered cistern adjacent to the main house (Fig. 33).

Tabby construction appears to have been introduced initially into the Manatee River section by Joseph Braden in 1845. Within a decade, tabby was established as the predominant mode of construction on the plantations of both Braden and Gamble. Gamble presumably acquired his knowledge of the material from Braden's example, though he might have had some awareness of the construction prior to his arrival in the Bradenton area.[1] The technique then spread to other locations along the Manatee River. The small tabby building on Shaw's Point,[2] is probably representative of this later diffusion (Fig. 35). Few facts are known concerning the origin of this building. Some local sources credit Spanish fishermen with its construction, while others, on a perhaps sounder basis, believe the structure was built by long term resident William Shaw and that its first use was as a smoke-house for the commercial processing of mackeral.[3]

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[1]American settlement of Leon County, Florida occurred after the Spanish reliquished control of the West Florida territories in 1821. Settlers to West Florida came from all parts of the South, though primarily from the nearby states of Mississippi, Alabama, and Georgia, particularly the latter. The Gamble family from Richmond, Virginia settled Leon County in 1828. Whereas the family background would seem to preclude any prior personal knowledge of the building mode, Robert Gamble may have obtained some information on tabby construction from his Georgia neighbors in Leon County.

[2]Shaw's Point marks the location of a once immense shell deposit, some forty feet high, spread over several acres, No doubt some shell from this midden went into making tabby on the nearby Gamble and Braden plantations. Depletion of the midden, however, was the result of twentieth century road building activities in the state of Florida. Ollie Fogarty, Fogartyville (Theodore Gause and Sons, 1972), p. 3.

[3]Hazen, October 1974, pp. 2-3.

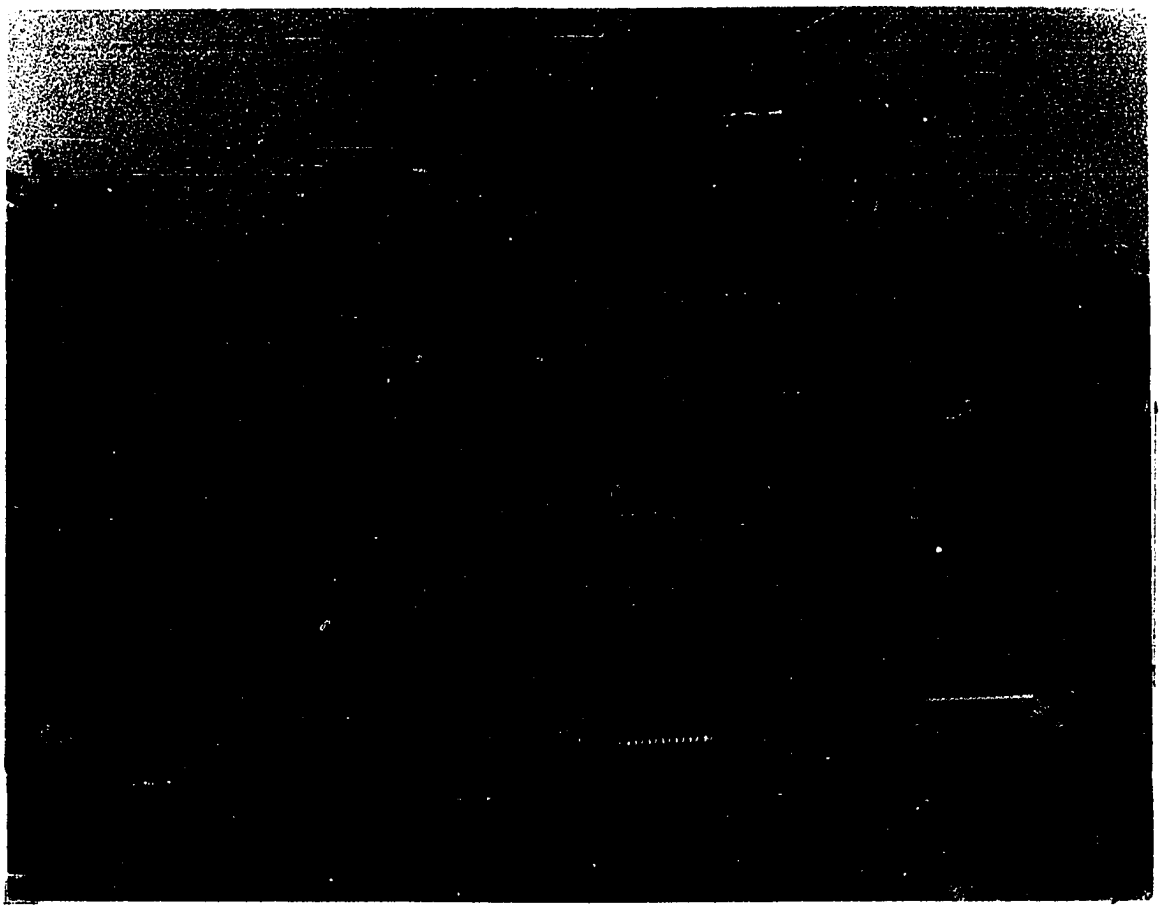

Fig. 35. Tabby house at Shaw's Point in 1900 photograph (near mouth of the Manatee River, Bradenton, Florida). From the collection of the Manatee County Historical Society

The Civil War and the End of Tabby Construction (1860-1920)

The year 1860, the beginning of the Civil War, marked the end of the plantation era and of tabby building in the Sea Island section and the Florida Gulf coast. Only a dozen tabby structures postdate the Civil War; half of these date between 1865 and 1875. Notable among construction in the post-war era was a three-story tenement house built in Savannah for freedmen in about 1870,[1] and several tabby buildings at the Penn School on St. Helena Island. The latter usage was particularly well documented. Photographs, taken around 1910, show the community hall under construction and the boy's dormitory soon after its completion (Figs 36 and 37). Other than these structures, tabby's use was relegated to the construction of foundations, chimney bases, and an occasional barn.[2]

The demise of tabby building in the late nineteenth century is the result of at least three factors. These include: 1) the general disruption in building activity due to the Civil War; 2) the attendant breakdown of the plantation system; and 3) the development of concrete block and inexpensive commerical cements. The Civil War and its chaotic aftermath had a generally disruptive effect on all non-military construction. Tabby was no more affected than other modes of construction. Yet for tabby, the interruption of the Civil War was to prove critical, in that the construction never regained its pre-war popularity. Several factors intervened to avert tabby's revival. The

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[1]Floyd, pp. 80.

[2]Ibid.

Fig. 36. Construction of the tabby foundation of Frissel Community Hall at Penn School, ca. 1900 (St. Helena Island, South Carolina). Leigh Richmond Miner's photographs of St. Helena Island

Fig. 37. Lather dormitory for boys at Penn School (St. Helena Island, South Carolina). From Leigh Richmond Miner's photographs of St. Helena Island

history of tabby in the nineteenth century was largely that of its use on the southern plantation. Emancipation and the dissolution of many of the coastal plantations after the war had important consequences for tabby building: first, by depriving tabby of its primary area of use; second, by dispersing the labor supply, and third by destroying the continuity of the building tradition. Despite these unfavorable circumstances, some technical knowledge of tabby construction continued to be passed on until the early part of the twentieth century. In contrast to earlier periods, ex-slaves and descendants of slaves, rather than the planter class, were the purveyors of the trait. The buildings at Penn School, for example, were constructed entirely through the cooperative effort of the freedmen on St. Helena Island. Photographs and descriptive narratives, however, point out that the islanders used wood, not tabby, for their own homes and farmsteads,[1] thus forestalling any popular revival of the construction.

Tabby's final demise was probably the direct result of the development of concrete block and inexpensive Portland cements.[2] Tabby was at a competative disadvantage with concrete made with Portland cement as it was the inferior material in terms of strength, durability, and versatility. Whereas little genuine tabby construction was

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[1]Edith M. Dabbs, Face of An Island: Leigh Richmond Miner's photographs of St. Helena Isalnd (New York: Grossman Pub., 1971), n.p.

[2]In 1871, a U.S. patent was granted to David Saylor for the American equivalent of Portland cement and a mill built at Coplay, Pennsylvania to manufacture the product. This marked the establishment of an artificial cement industry in the United States. "Plain Concrete Construction," Journal of the Society of Architectural Historians: 158.

evidenced after the advent of commercial cements, several attempts were undertaken in the 1880s and early 1890s to construct tabby-like buildings using Portland cement. Three such examples were the two-story Hollybourne cottage on Jekyll Island, Georgia, the Lewis House at Fernadina Beach, Florida, and the monolithic Ponce de Leon Hotel in St. Augustine.[1]

The last date for new tabby construction in the Sea Island districts was 1920. Knowledge of the building techniques today survives only in the literature and with the tabby remnants prominent on the cultural landscape. Yet the latter are certain reminders that tabby once offered a viable alternative to wood, brick and stone in coastal sections of the Southeastern United States.

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[1]"Hollybourne" was built in 1892, the Lewis House in 1885, and the Ponce de Leon Hotel between 1886 and 1888.

Chapter IV

THE PROBLEM OF ORIGIN

Chapters Two and Three have dealt with the nature of tabby, methods of construction, and the historical distribution of the material within the United States. This chapter investigates the derivation of tabby construction, with emphasis on the three interrelated aspects thereof: material, usage, and methods. It is the purpose of this chapter to consider the three variables in an historical context to describe the nature of their contributions to the trait complex and to explain how they ultimately came to be fused into a single tradition.

The Material Aspect: Some Considerations in Regard to Origin

Research on tabby's origin involved the greatest number of problems. For instance, by 1728, the material occurred in limited distribution on portions of two continents: the southeastern coast of North America and the Senegal River delta of West Africa. The earliest datable tabby has been found in Spanish Florida; it is possible, however, that tabby of the Senegal River delta area is older, and, moreover, a local innovation.

African Tabby: Material and Construction Techniques

More than one observer has reported the presence of tabby-like material in coastal West Africa. Pere Labat's Les Relations du Pere Labat contained the earliest description of "African tabby." Labat

confirmed the use of shell for the manufacture of lime at St. Louis, Senegal as early as 1728, noting that the lime was very adhesive and made a good masonry substance.[1] Later in his writings, he described two types of houses for the region: "the negroe huts and those that were built in the mode of the Portuguese."[2] Likely the Portuguese style houses were masonry structures, such as the type later constructed at Fadiout (Saloum delta).[3] The detailed account of contemporary housing at Fadiout, provided by G. Brasseur, leaves little doubt as to the nature of the building material. It is described as a kind of concrete prepared with lime, shell, sand, and sea water and mixed together with a hoe.[4]

The Senegalese tabby houses exhibited a form of construction different from the Spanish and British-American built houses. The former house may be best described as concrete block. The procedures for block construction, as reported by Brasseur, were as follows: 1) after the concrete had been thoroughly mixed, it was poured into wooden boxes, without bottoms or lids; 2) from these were obtained a series of concrete blocks of the dimension 35 x 15 x 12 cm. (13.6" x 7.65" x 5.65") 3) once the blocks were seasoned, wall construction commenced; 4) during the final construction stage, the walls were

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[1]Pere Labat, Les Relations du Pere Labat, vol. 2, p. 144.

[2]Ibid., vol. 4, p. 367.

[3]G. Brasseur, "A Propos Des Maisons En Dur Fadiout," Notes Africaines, p. 119.

[4]Coastal shell middens provided shell for lime and the course aggregate. Senegalese procedures for making lime were basically the same as the British-American procedures. Brasseur reported that on a bed of wood three and a quarter meters in diameter (eleven feet), shell

raised by assembling the blocks with lime mortar.[1] The Senegalese house, built in this manner, was rectangular in form, generally measuring four by seven meters (thirteen by twenty-three feet) and usually subdivided into two rooms.

The Senegalese Tradition and Spanish Tabby

Because of the limited data available, it is not known to what extent one cultural tradition may have influenced the other. There were, for example, ample opportunities for contact, terminating in cultural exchange, between the Spanish and the Senegalese. As early as the sixteenth century Spanish and Portuguese slave ships were common sights in Senegalese harbors. The Spaniards could have been introduced to tabby from examples of the material seen here, or from slave accounts in the Caribbean or Spanish Florida. The possibility exists that tabby is a Spanish innovation, which later was carried by the Spanish, Portuguese, or even the English from the American provinces to the coast of Senegal. Several realities cast doubt on a hypothesis favoring an African origin. First, West African cultures were more often receivers than the donors in any cultural exchange with the Portuguese or the Spanish. Second, the trait was not widespread in West Africa. It was present at St. Louis (Senegal) by 1728, and at Fadiout by at least 1914-1918, more recently it was observed at Serer Niominka settlements. Third, the earliest masonry houses in West Africa appear to be Portuguese in style.

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was heaped to a height of about one meter (about three feet); then additional wood was collected and the fire lit. Ibid., p. 117.

[1]Ibid.

New World Development of Tabby

Consideration of tabby as a Spanish innovation opens up other lines of inquiry, such as the place, time, and means of its development, not to mention the question of its antecedents. St. Augustine records, archaeological data, and linguistic evidence have provided some information on the place and time of the innovation, but very little on the development. The data generally support the concept of the New World derivation of tabby, though there is no record of how it evolved. For this reason, several propositions have been developed. The first theory derives tabby from the Mediterranean building earths; the second sees its evolution in the Spanish roof mortars; the third relates tabby to Roman concrete; the fourth and some ways the most acceptable hypothesis, perceives several developmental lines and notes the contribution of each to the evolution of the material.

Tabby Antecedents: Some Alternative Propositions

Derivation of tabby from the Mediterranean building earths.

The first developmental theory emphasizes the role of rammed earths. It hypothesizes three evolutionary stages in the development of tabby: tapia to tapia real to tabby. The stages represent changes or innovations in rammed earth, or tapia, construction during the material's long and varied history.

History of Spanish rammed earths. The rammed earth technique originated in Southwest Asia. At Sialk, Iran, archaeologists have dated cob-like tapia (pise) to pre-4000 B.C.[1] Tapia (earth compacted

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[1] A.E.S. Alcock, "Rammed Earth Technique in West Africa," Housing and Town and Country Planning. United Nations, New York. Bulletin No. 4 (October 1950), p. 43.

between boards) and adobe (sun dried bricks) have been considered parallel developments; both have been viewed as outgrowths of the more ancient cob construction, in which wet earth was moulded by hand to form walls.

Rammed earth building spread from its Middle Eastern hearth to Europe sometime before the Christian era. Roman writers Marcus Terentius Varro and Plinius Secundus attested to its presence in Spain in 36 B.C. and A.D. 67 respectively. Later writers have speculated on its manner of introduction. Several have concluded from Pliny's remarks in the Natural History that the Phoenicians introduced tapia to North Africa and from there the Cartheginians carried it to Spain, though the more popular opinion has been that the Phoenicians introduced rammed earth to Africa and Spain.[1]

Pliny's comments on rammed earth building and its historic uses were as follows:

> . . .moreover, are there not in Africa and Spain walls made of earth that are called framed walls (formaceum), because they are made by packing in a frame enclosed between two boards, one on each side, and are stuffed in rather than built, and do they not last for ages, undamaged by rain, wind and fire, and stronger than any quarry-stone? Spain still sees the watchtowers of Hannibal and turrets of earth placed on the mountain ridges.[2]

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[1] See "Spanish Architecture," Quarterly Review No. 77 (1846), p. 504; "Art. IX.- Cob Wall & c.," Transactions of the Institute of British Architects, vol. 1, part 1 (1836): 537.

[2] ". . .quid? non in Africa Hispaniaque e terra parietes, quos appellant formaceos, quoniam in forma circumdatis II utrimque tabulis inferciuntur verius quam struuntur, aevis durant, incorrupti imbribus, ventis, ignibus omnique caemento firmiores? Spectat etiam nunc speculas Hannibalis Hispania terenasque turres iugis montium impositas." Plinius Secundus, Natural History, vol. 35; 169. Loeb Series, translated by H. Rackham (Cambridge, Mass.: Harvard Univ. Press, 1938), pp. 384-385.

Marcus Terentius Varro made several of the same observations. In Rerum rusticarum libri tres, written 36 B.C., he noted a type of fence made of earth and gravel in a mold, which he said might be found in Spain and the region about Tarentum (the modern Taranto, Italy).[1] It should be observed that Varro did not mention its presence in Africa, or refer to Hannibal's use of the material in Spain.[2] The variance in accounts may represent differences in scholarship or document the changes in tapia's distribution from the time of the second Punic War to A.D. 67.

It is learned from Pliny's statement that Hannibal used the material to build watchtowers, but it is not indicated at what time or place he acquired the necessary skills and first experience with the construction. The Cartheginians may have acquired them in Spain, or as some historians believe, learned them in the colonies of North Africa. At least two historians cited the watchtowers as the earliest examples of rammed earth construction on the Iberian Peninsula. They regarded Hannibal as the principal purveyor of the trait, observing that he

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The watchtowers of Hannibal were thought to have been constructed during the second Punic War (218-201 B.C.). At the time of Pliny's visit to Spain (ca A.D. 67) the structures would have been close to three hundred years old.

[1]Marcus Terentious Varro, Rerum rusticarum libri tres. Loeb Series, translated by W.D. Hooper and H.B. Ash (Cambridge, Mass.: Harvard Univ. Press, 1934), i, 14, 4. The Italian port city of Taranto is located on the north inlet of the Gulf of Taranto.

[2]Pliny's familiarity with Africa would seem to have been limited to the Nile Valley of Egypt and the Roman-controled south Mediterranean coast. Thus, his reference to Africa is probably to North Africa, more particularly to the region south and east of the Pillars of Hercules (the Strait of Gilbraltar).

introduced it to Spain and initiated its spread. The inference, of course, was that the building technique was present in North Africa, where it may have been introduced by Phoenicians or earlier cultural vectors from the eastern Mediterranean.

Perhaps the defeat of Carthage in 146 B.C. and its aftermath contributed to the demise of tapia in North Africa. Whatever the cause, by 36 B.C. (the date given for Rerum rusticarum libri tres) it had ceased to be popular, for Varro notes its use only in Spain and Taranto. Its presence in Spain and Africa was substantiated by Pliny 132 years later. It then follows that its reintroduction to North Africa must have occurred sometime between 36 B.C. and A.D. 67.

This time span does not wholly conform, however, to the facts supplied by later travel narratives and archaeological and linguistic evidence. In the tenth century the Muslim traveler Abenhaucal mentioned the construction as being something distinctly Spanish, and not to be found in other provinces. Lacking an Arabic or Berber word for the mode of construction, Abenhaucal, and later the Moroccans Idrisi and Abenadari, called the material tabiya, derived from the Spanish world tapia.[1] By the end of the tenth century the construction had spread south to cities in Morocco and Tunisia. Its popularity increased during the eleventh and twelfth centuries.[2] As a featured

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[1]Joan Corominas, Diccionario critico etimologico de la lengua castellana (Bern, Switzerland: Editorial Francke, 1954), pp. 373-374.

[2]By 1300 the construction and related terminology had become such an integral part of North African architectual tradition, that even Muslim scholars considered it an indigenous building form.

component of Almoravid and Almohad architecture, its uses were largely military, that is, for walls, ramparts citadels and fortified residences. The ramparts of Marrakesh are one of the two surviving examples of Almoravid architecture in the city of Marrakesh and possibly the oldest relict of rammed earth south of Gilbraltar.[1] The ramparts were believed to have been constructed in 1126 or 1127. Built chiefly of reddish tapia, they measure 2 meters (about 7 ft.) at the base and 1.40 meters (about 5 ft.) at the crown and were originally 9 kilometers (approx. 5 3/4 miles) in length.[2] The tapia walls around the cities of Tlemcen and Fez were constructed by the Almohads, though the rammed earth fortifications at Rabat grew out of the castle of a military holy order.[3] The material was used in a similar fashion in Andalucia.[4] The cities of Cordoba and Seville, like those in Morocco and Algeria, were encircled by walls of tapia. Other military uses included the Tower of Enfantas (a Martello tower) in Granada. After the demise of the Almohad empire, in 1269, tapia's domestic uses became more important than its military applications, especially in Spain. It became an established folk building material in Andalucia

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[1]Alexandre Lexine, Carthage, Utique, etudes d'architecture et d'urbanissme. Publications de la section antiquite du centre de Recherche sur l'Afrique Mediterraneeme. Faculte des Lettres, Aix-en-Province (Paris: Editions de Centre National de la Recherche Scientifique, 1968).

[2]Rom Landau, Morocco, Marrakesk, Fez, Rabat (New York: Putman & Son, 1967), p. 58.

[3]Ernst Kuhnel, Islamic Art and Architecture, translated by Katherine Watson (Ithaca: Cornell Univ. Press, 1966), p. 130

[4]Anadalucia was the region of southern Spain, which after 1833 was divided into the eight provinces of Almeria, Cadiz, Cordoba, Huelva, Jaen, Malaga, Seville and Granada.

and from their spread to France and Portugal. In Morocco it retained some prominence in military construction until the late seventeenth century. The Palace of Mequinez in Mogadore, built by Mulae Ishma'il in 1677, is an outstanding example of a casa fuerta (fortified residence) from the latter period. Constructed as a military stronghold, its tapia walls are massive, some of them are stated to be twenty-five feet thick.[1]

The Moorish adoption of the construction and their interest in its military applications had important consequences for the later development of tabby. After 1200, most Moroccan tapia, known as tabia, and sometimes tabbi, contained, in addition to clayey earth, a certain amount of lime and stone, that after ramming produced construction that was stronger and more resistant to shrinkage than the Spanish made tapia.[1] Such qualities were especially valued in Almohad military construction where strength was required and massiveness an asset.

Sometime between the thirteenth and sixteenth century the innovation reached Spain. The Spanish called it tapia real, or royal tapia, a designation that made an appropriate distinction between it and the simple earth mixture, which was popular for rural housing. The

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[1]Budgett Meakin, The Land of the Moors (London: Messrs. George Allen & Co., Ltd., 1901), p. 209.

[2]More often tabbi referred to a mortar composed of lime and earth. In Mechanics' Magazine and Journal of Mechanics Institute (New York) vol. 9 (April 1837): 235, the following instructions were given for its preparation:

> "Algerine Mortar-
> Mortar-2 parts wood ashes, 3 parts lime, 1 part sand to this composition they give the name Tabbi. After mixing these ingredients together, they throw in a quantity of oil and beat the whole together for three days and nights without intermission by which time it has attained the proper consistence."

new material made little impact on Spanish folk housing. Earthen houses and outbuildings in rural Spain continued to be constructed in the traditionally prescribed manner. Its greatest immediate impact was on military usage in which importance was placed on the increased strength and greater durability of the material. With the added benefit of relative low cost and readily available raw materials, tapia real, or tabia, had a wider range of suitabilities than tapia, especially for large scale construction. Caribbean and Central American examples of the material date to the sixteenth and the first half of the seventeenth century. Nearly all occurrences of the material post-date that of tapia in the same areas. Thus, there may be a sequence of development, beginning with tapia, progressing to tapia real (tabia), and perhaps ending with tabby.

Tapia and Tapia Real in the Caribbean and Central America

Ponce De Leon's casa de tapia at Caparra, Puerto Rico has been established as the earliest example of Spanish built rammed earth in Puerto Rico and possibly the first of this type of construction in the Caribbean. Constructed for Ponce De Leon in 1509, the casa de tapias served as a residence and fortified outpost.[1] In De Leon's

[1]The decision as to what kind of house to build possibly was made long before the expeditions arrival on the island. It is certain that Ponce De Leon brought roof rile and brick with him. There is no evidence that he transported lime or other materials. Evidently he planned to use local materials and may have even decided on the type of construction.

words:

> It is a modest house, with its terraced roof, battlement, and its merlons and its barrier in front of the door, all plastered inside and out, to the height of seven tapias with the battlement and merlons.[1]

Most information about the structure has come from archaelogical excavations of the Caparra site. Such investigations have pointed out the inaccuracy of the historical designation casa de tapias; Ponce's house might be better called casa de tapias y piedra.[2] It may be noted that three of the exterior walls were of tapia and the fourth, which was designed to sustain a larger load, of stone rubble.[3] In most other respects it was indeed a tapia house. It was not a tabby house as some author have suggested.[4] As stated in the archaeological survey report:

> In order to form the tapias of Caparra, they have rammed in molds of nailed wood, earth mixed with bits of stone, small bits of hewn stone, brick and manufactured items, in the same way, in much less quantity, limestone and some round stones.[5]

The tapia walls do not contain lime, though lime mortars are present elsewhere in the structure: in the rubble wall, in the terrado, the stucco and the foundation. It is the latter that most resembles tabby.

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[1]Relacion a Ovando en "Boletin Historico de Puerto Rico," vol. 1, pp. 119-120. Cited in De Hostes, p. 22.

[2]See Oviedo's comments in "Historia General y Natural de Las Indias," vol. 1, p. 469. Cited in De Hostes, p. 22.

[3]Adolfo De Hostes, Investigaciones Historicos, 1938, p. 49.

[4]Chatelain, p.129

[5]De Hostes, p. 47.

De Hostes noted that the foundation was harder and thicker than the tapia walls and seem to be composed of a chocolate mortar of lime and coarse materials.[1]

Ponce De Leon's house was just the first of a number of structures constructed of tapia and later tapia real in the Caribbean and Central America and parts of the Caribbean. Period documents indicate that some portion of Santo Domingo's housing, as well as that of San Salvador, was of tapia. Oviedo, for example, compares the houses of Santo Domingo with those of Barcelona, which, he says, were of stone but also of ". . .hermosas tapias y tan fuertes, que es muy singular argamasa. . .[2] Besides housing, there were also other kinds of tapia structures from this century: several Franciscan convents, churches, a monastery, and a section of the Capitania, the seat of audencia, Antigua, Guatemala.[3] Stone and brick became the favored materials in the seventeenth and eighteenth centuries, though tapia real continued to be used in some public buildings. The building occupied by the now obliterated church of the Beaterio de Indias, built sometime in the mid-eighteenth century, was constructed of tapia and tapia with brick reinforcing, respectively.[4]

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[1]Ibid., p. 48

[2]Oviedo y Valdes, Sumario, p. 88. Cited in Sidney D. Markman, Colonial Architecture of Antiqua, Guatemala, vol. 64 (American Philosophical Society, Phila., Pa., 1966), p. 25.

[3]Ponce, Relation, pp. 403, 434; Markman, p. 25.

[4]Ibid.

Several changes took place in the material's composition and in construction during the course of its New World usage. Early tamped earth buildings, those dating to the first half of the sixteenth century, were built much on the order of Ponce De Leon's house. The most notable difference was in the composition and color of the soil mixture. It was this difference that establishes the antiquity of the Caparra House. It was not built of red earth like later structures. The soil in Ponce De Leon's house was dark brown and locally derived. Preference for red earth came later in the century. Its earliest use was in the tapia of the Franciscan convent at Santo Domingo, thought to have been built in the first quarter of the sixteenth century.[1] During the second half of the sixteenth century, further improvements took place in the material. By 1582, the component materials for building a tapieria were said to be red earth, sand, lime and coarse stone, which after ramming, resulted in a material that was considerably stronger than the earlier tapia. Several writers have attested to its durability. One of them noted, ". . .that it is easier to break a wall of hewn stone than a tapia one."[2] The final phase of the proposed three stage development, that is the hypothetical development of tabby, was not manifested until the late seventeenth century, with its first appearance in Spanish Florida.

Contribution of the Roof Mortars to the Development of Tabby

The second proposition stresses the relationship between tabby and the roof mortars of Spain, the Caribbean and Middle America. It is

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[1] De Hostes, p. 48

[2] Melgarejo, "Memoria de Melgarejo," Capitulo 31, 1582.

conceivable that the stimulus for tabby's development in Spanish Florida came from the maintenance requirements of locally built flat roofs. In areas of abundant rainfall, such as the southern Atlantic coast, masonry-covered flat roofs or mortar and tile roofs were imperative. Flat roofs in Spanish Florida are first mentioned in letters to the Crown, dated 1580, and are specifically described as acuteas y cal or flat roof of lime (lime mortar). According to Manucy, the acuteas y cal was a tabby slab roof and its construction much like that of later flat roofs.[1] The original references, however, made no such specification. To quote Marque's letter dated March 25, 1580, from Santa Elena:

> This village is being very well built, and because of the method which is being followed, any of the houses appears fortified to Indians, for they are all constructed of wood and mud, covered with lime inside and out, and with their flat roofs of lime (acuteas y cal). And as we have begun to make lime from oyster shell, we are building the houses in such manner that the Indians have lost their mettle. There are more than sixty houses here, whereof thrity are of the sort I am telling your majesty.[2]

A few months later, Vigneras wrote from St. Augustine:

> "This fort is covered with wood with fill overhead of lime and sand."[3]

The roofs, so described, were not necessarily tabby slab roofs. It can be argued that the flat roofs of Santa Elena (Port Royal Island) and St. Augustine were of mortar, not concrete (tabby) and that they were constructed in the style of the sixteenth century Mexican and

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[1]Manucy, Houses of St. Augustine, p. 104.

[2]"Letter from P. Menendez Marques to the Crown, Santa Elena, March 25, 1580." Translated from Spanish in Colonial Records of Spanish Florida (Deland, Florida: Florida State Historical Society, 1925) 2: 267 (Connors, ed.).

[3]Lorenzo Sanchez de Mercado, "Letter to the Crown, 1580."

Caribbean mortared roofs.[1] It also can be argued that the similarities in certain ingredient materials outweighed the constructional differences and that later tabby evolved directly or indirectly from the roof mortars of the sixteenth century.

Roman Concrete as Tabby's Antecedent

The third theory, based on diffusionist's propositions, assumes a direct and intimate relationship between tabby and Roman concrete. The emphasis is on the single derivation of concretes. Proponents of this view see Roman concrete as tabby's antecedent. They infer that there was a deliberate attempt to imitate Roman construction, and suggested that tabby was just one of several concretes developed after the Roman model. To quote historian Albert Manucy:

> . . .the Spanish mind seems to have no trouble accepting all the various names (cal, ostion, ripio, tapia, mamposteria, ormigon, argamasa) given to their shell concrete in Florida, even when terms often and obviously were synonymous. Probably the reason is that the fundamental formula for such concrete was unchanged despite unavoidable local differences in materials. And from this broader viewpoint, concrete wherever found stems from a single origin, possibly Roman. Spain is full of Roman ruins.[2]

The problems with this proposal are two fold: 1) the absence of supporting data, and 2) the strict adherance to the concept of a single origin for like traits and total rejection of other independent lines of development. Roman ruins in Spain, many of which contained samples of Roman concrete, undoubtedly had some influence on subsequent Spanish developments, though this influence would seem to be

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[1]See pages 170-71 for discussion of Mexican and Caribbean roof mortars.

[2]Manucy to Gritzner, November 10, 1974, p. 2.

neither direct nor particularly strong. Spanish builders possibly adopted patterns of usage from the Romans, most notably the use of concrete masonry in vaulted ceilings, flooring and in certain types of walling.

Independent Development Thesis

The last of the four propositions envisions a combination of influences. The most important roles are allotted to the Mediterranean building earths and Spanish roof mortars. The theory emphasizes the independent development of tabby. Its support comes largely from developmental data. For example, there is good evidence of a developmental sequence, beginning with the building earths and roof mortars and culminating with concrete. It was more than just a substitution of new materials for the old in a familiar formula, whether it was for roof masonry or walling. Change in composition and form is inherent in the sequence. In several instances the sources contributing to change duplicate those that led to the development of Roman concrete.

Comparison of the developmental sequence for Roman concrete and tabby. Three practices or innovations have been said to have contributed to the development of Roman concrete. They included: 1) the traditional rubble work of Greece and Italy; 2) the development, through experimentation, of an almost perfect mortar, and 3) possibly, several of the construction techniques associated with rammed earth building. M. Blake has cited rubble work with mud or lime binder as the probable forerunner of Roman concrete.[1] Knowledge and basic

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[1] Blake, p. 324.

skills for this construction probably came from Greece, though they also could have been independently developed in Italy. Certainly surviving remnants of rubble masonry show that it was employed in foundations in Greece and Italy from a very early period. After the third century B.C., lime-sand mortars gradually supplanted clay and pure lime as a binder in Roman-built rubble masonry. The resultant construction began to take on the appearance of concrete, though much of it was so weakly bound that it had to be designated quasi or pseudo concrete. The transition from quasi concrete to true concrete came with the development of lime-pozzolana mortar. The use of the latter produced a concrete which was unequaled in quality until the discovery, in fairly recent times, of Portland cement.[1]

Coinciding with the development of material was the equally important evolution of building techniques. Roman constructional techniques fell into two categories: 1) those that were borrowed, and readapted and 2) those that were developed techniques. Acquired techniques for the most part came out of the mortar and rubble traditions of Greece and Northern Italy and Middle Eastern rammed earth. It is likely that the idea of using a formwork to hold the concrete mixture while it was hardening was adopted from the building methods associated with rammed earth construction.

Tabby's evolutionary sequence contained some of the same elements though the cause and effect relationships differed. The building earth for example, would seem to have played a more important role, making at least three important contributions to tabby's development. First, they contributed to the development of the material; second, to the

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[1]Ibid.

establishment of patterns of usage; and third, to the inventory of construction techniques. It may be suggested, for example, that the invention of shell concrete (tabby) be related to contemporary experiments with earth materials. The tapia mixtures of the late sixteenth century Caribbean contained the same basic ingredients as tabby, though in different proportions. Thus, with one or two substitutions, e.g. shell for stone aggregate, and some minor changes in the formula, it would be possible to produce a concrete (tabby) from a stabilized earth (tapia real).

Also it is suggested that tabby's early patterns of usage were dictated by the traditions established for the building earths. Parallels in usage existed on several levels, but were most apparent in residential construction. There were, for example, notable similarities in the style and class of housing built. Given the fact that tabby and tapia had different geographical distributions, thus they were never in a competative position, the corresponding uses of the materials can be interpreted as evidence of a developmental relationship.

Comparison of the two materials also show marked similarity in certain of the technological aspects of construction. The use of a formwork in wall construction was probably the most important shared feature and was the one that seems most characteristic of Spanish tabby construction. Other uses of tabby viz., for flat roofs, slab floors, and in combination with wood for certain kinds of walling (ostion y postes) would seem to have been incidental to this extremely popular method of construction. The use of formworks in conjunction with tapia and tabby was either evidence of an evolutionary sequence

viz., tapia to tapia real (tabia) to tabby or that of the selective adaptation of existing building methods to new materials.

Impetus for tabby's development also came from sixteenth century experiments with roof mortars in Spanish Florida. Contribution of the roof mortars to tabby were two fold. First, they furnished the basic formula for the shell-based lime-sand mortar, that later was used in the manufacture of tabby, and second, stimulated the development of domestic sources for ingredient materials. The two components of the roof mortars: lime and sand were supplied locally. Lime, for example, was made from oyster shell. It was this discovery that keynoted the development of tabby, and that was prerequisite to a flourishing tabby tradition.

Lime was first produced from oyster shell in 1580. Prior to this time, stone lime was imported from Cuba. The instructions to Quiro and Ruiz, dated 1577 included a request ". . . to bring six pipes of lime from Havana."[1] Period documents emphasized the need for a local source of lime.[2] Imported lime was costly, in short supply and strictly allocated; it was available only for high priority military use.[3] The discovery of how to make lime from oyster shell had

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[1]"Instructions to Quiro and Ruiz, 1577," Colonial Records of Spanish Florida, trans. by J. Connors, vol. 2, p. 13.

[2]". . .he said that the first thing needful is to provide said forts with lime and stone, which may be brought from said Havana, for a large part of them has fallen to pieces, and the soil is all pure sand," Pascual Navarro, "Investigation of the Return of Las Alas, 1570," Colonial Records of Spanish Florida, trans,. by J. Connors, vol. 1, p. 315.

[3]The high cost and limited availability of lime also posed problems in other Spanish settlements. In sixteenth century Mexico City, lime, used in the preparation of mortar, was an expensive item in building operations. In 1531, a tapia or outer wall of rubble and mortar construction (cal y canto), two yards wide and one yard high,

important ramifications. It was preliminary to the development of the stone (coquina) and tabby masonry traditions of Spanish Florida. The greater availability and its lower cost allowed for the substance's use in a variety of low priority construction and permitted the experiments with lime-based building materials (viz., mortars, stuccos and stabilized earth).

Terminology for the Material and Form of Construction

Linguistic data lend further support to the independent development thesis. Cited as evidence are the terms used by the Spanish in St. Augustine and by the British-Americans in Georgia, South Carolina and Florida for the material and various construction forms.

Spanish Terminology for Tabby

Despite suggestions to the contrary, the Spanish never applied the Old World terms for the building earths to the New World material (tabby). In the eighteenth century housing surveys of St. Augustine, officials referred to house walls constructed of tabby by a variety of designations, such as casa de ripio, casa de ostion, casa de piedre de ostion, and casa de mamposteria. A different set of terms

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took one hod of lime valued at one peso. Since the cost of labor and stone together was also one peso, lime itself was the most expensive component.

Shortages of lime occurred frequently in the sixteenth century In 1552 a lime shortage halted work on government buildings in Mexico City. Cut stone construction (canteria), which required less mortar than rubble masonry (cal y canto) and was thereby less expensive, gained considerable popularity. George Kubler, Mexican Architecture of the Sixteenth Century (New Haven: Yale Univ. Press, 1948), vol. 2, pp. 167-168.

was applied to tabby roofs and floors. Most of these referred to the form of construction rather than to a specific material. No use was made of the Spanish terms tapia, tapia real or the Arabic-Berber tabia and tabbi to describe the building material, construction technique or form of construction. It would seem that Spanish officialdom viewed tabby as something quite different from the building earths and African mortars. In the case of house walls they devised an entirely new set of reference terms. The new vocabulary emphasized the inherent differences between concrete, regardless of quality, and earthern materials.

Significance also can be attached to the number and character of the names for tabby structures, though the evidence in this instance is far from conclusive. The noted historian Albert Manucy sees the variety of terms as a linguistic trait or cultural expression. He notes:

> One thing nags me, however, in the attempt to categorize "Florida tabby"; the Spanish mind seems to have had no trouble accepting all the various names (cal, ostion, ripio, tapia, mamposteria, ormigon, argamasa) given to their shell concrete in Florida, even when the terms often and obviously were synonymous.[1]

On the other hand, the number of terms used in the eighteenth century may be indicative of the recentness of tabby's development and the existence of more than one naming vocabulary. The selection of a name for the material possibly lagged behind its development and use. Thus, many names might be applied before one emerged as "the accepted designation." Eighteenth century usage lends some support to this argument.

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[1]Manucy to Gritzner, 10 Nov. 1974.

Terminology for house walls

Elixio de la Puente's survey of housing in 1764 provides the earliest documentation for the designation casa de ripio. In both historical and contemporary Spanish usage, the term ripio pertains to the rubbish or fragments from bricks, rocks, and other masonry building materials.[1] It also connotes the residue left over from something. By this definition, ripio might be the debris produced in the quarrying of coquina or even the whole or broken oyster shells from the kitchen middens around St. Augustine (indeed the remnants of an aboriginal shellfish diet). When the term was applied in eighteenth century St. Augustine, ripio probably carried two meanings. It denoted masonry fragments and other rubble and concrete (tabby) prepared from debris materials (coquina chippings, oyster shells, etc.).

By Rocque's survey of housing in 1788, the general designation casa de ripio had passed out of use and had been replaced by casa de mamposteria and the more specific casa de ostion (hostion), perhaps a variant of casa de piedra de ostion (see table 5).

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[1]Sebastian de Covarrubias, Tesoro de la Lengua Castello o Espanola (segun la impresion de 1611), con las adiciones de Benito Remigio Noydens publicades en la de 1674) (Barcelona: S. S. Horta, I. E., 1943 Diccionario Enciclopedico Salval, Secunda Edition, (Barcelona: Salval Editores, 1944), p. 1157; J. Corominas, Diccionario Critico Etimologico de la Lengua Castellana (Berna: Editorial Franke, 1954), pp. 32-35.

TABLE 5

CHANGES IN TERMINOLOGY FOR TABBY HOUSES

BETWEEN 1764 and 1788

Number of Apparent Carry-Through Buildings	DATES La Puente's Survey 1764	Rocque's Survey 1788
12	ripio	mamposteria
3	ripio	mamposteria y madera
1	ripio y tablas	mamposteria
6	ripio	ostion
2	ripio	ostion y madera
2	ripio	ostion y mamposteria
2	ripio	ostion, madera y mamposteria

SOURCE: Elixio de la Puente, "Plano de la Real Fuerza, Baluarte, y Linea de la Plaza de Sn Agustin de Florida . . ." 22 January 1764; Rocque, "Plano Particular de la Ciudad de Sn Agustin de la Florida," 1788. After Manucy, Houses of St. Augustine, 1962, p. 163.

The term mamposteria, Spanish for "masonry," generally designed rubble-stone work, but occasionally extended to related forms of construction. In the 1788 survey of housing, Rocque applied mamposteria to both tabby and coquina structures. By his usage of terms, he accomplished two things: 1) he affirmed the similarity of the two building materials (tabby and shellstone/coquina), and 2) placed tabby in the linguistic category of masonry construction. Casa de ostion, literally "oyster house," retained some of the meaning of the earlier designation casa de ripio. Ostion (hostion), the Andalusian word for an exceptionally large, coarse oyster, like ripio, described the coarse aggregate in the tabby mixture, but unlike the earlier term, it specified oyster shell as the rubble component.

Terminology for roofs and floors

The terms for tabby house walls in eighteenth century St. Augustine did not apply to roofs and floors of the material. The latter had a separate reference vocabulary. It was constituted of non-specific terms. Most were standard items in the Spanish constructional vocabulary, which had broad applicability and fairly extensive geographic distribution. Tabby slab roofs were called various: azotea (flat roof), azotea de cal (limed flat roof), or techada de tabla (board roof) and the roofing material - argamasa (mortar), torta de ormigon (concrete fill) or cal (lime).[1] Tabby floors simply were designated: suelo (pavement) or suelo de azotea (slab floor).[2]

English-American Terminology

The earliest documented use of the word "tabby" in the Southeast was in a report to the Georgia Commons House, dated November 11, 1762, regarding the status of fortifications in Sant John Parish.

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[1]"Solana to the crown," 22 April 1759; Connors, 2: 282, "Discrezion de la Planta del Castillo, 1686;" Pablo Castello, "Property Appraisals of December 28, 1763: the Governor's House," and Juan de Cotilla, "Property Appraisals of 1763: houses of Joaquin Blanco, and Antonio de Rodriquez-Juan de Salas," transcribed and translated in Charles W. Arnade, "Architectural Information of Early Spanish St. Augustine," St. Augustine Historical Restoration and Preservation Commission, 1960. (Mimeographed).

[2]The Spanish phrase (suelo de azotea) intimates that the floor and roof construction (torta de azotea) are similar. Albert Manucy observed:

> "John Bartram said that a tabby second floor ("terraced chamber floor") was often to be found in a common tabby-and-thatch house. In such cases we wonder if this were not built the same as a single-story flat-roofed house, with a thatch roof added for dryness." (Houses of St. Augustine, 1962), p. 120.

This report stated:

> That at a Point called Cedar Hammock about eight Miles below Sunbury there is a House Twenty feet in Length and Twelve feet in wedth [sic]. There are also upon the same point some Remains of A Battery of Tabby Work which M[r] Bosomworth had agreed with the Commisioners of ffortifications to build but before the same coud[sic] be finished it was Overwhemed and washed away by the Sea a strong North East Wing setting the Sea in to a very great Height.[1]

Prior to this date, English writers referred to tabby construction as "tappywork" or "tappy." These terms appear in several early descriptions of the Frederica settlement:

> The Town is divided into several spacious streets, along whose sides are planted Orange Trees, which in some time, will have a very pretty Effect on the View, and will render the Town pleasingly shady. Some Houses are built entirely of Brick, some of Brick and Wood, some few of Tappy-work, but most the meaner sort of Wood only.[2]

> That instead of the false Representation in the said Gazatteer [sic]. That only seven Houses were in the Town of Fredericka, the said Town has several Streets, in every one of which are many good Houses, some of Brick, some of Tappy (which is a cement of Lime and Oyster Shells), That the High Street is planted with Orange Trees and has good Houses on both sides.[3]

The same terms also are recorded later in the century.[4] Tabby, it would seem, did not replace immediately "tappy" and "tappywork." In the second half of the eighteenth century, the building material was

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[1]A. D. Candler, ed., Colonial Records of the State of Georgia, vol. 13, p. 723.

[2]London Magazine, 14 (1745): 395-396

[3]London Magazine (1747)

[4]Dr. Miligan, "Short Description of the Province of South Carolina," 1763; Captain Hugh McCall, The History of Georgia: Containing brief sketches of the most remarkable events up to the present day 1784; reprint ed., Atlanta: Cherokee Pub. Co., 1969), pp. 45, 119.

known by a variety of terms with "tappy," "tappywork," "tabby," "tabbywork," and even "tapia" in equal contention.[1] By 1800, usage was established and tabby became the accepted term. The other terms were rejected and writers adhering to their use censured.[2] Yet, the problem of misuse of terms persisted. In 1844, Thomas Spalding wrote: "Tabby and not Tappy, as it is printed, a mixture of shells, lime and sand in equal proportions by measure and not weight, makes the best and cheapest buildings where the materials are at hand, I have ever seen."[3]

Etymology of "Tabby"

Three possibilities are suggested for the etymology of the term "tabby:" 1) it comes directly from the Spanish word tapia, 2) from several African words with similar meanings, or 3) has a multiple derivation with word associations in Spanish, Portuguese, English, Arabic and West African languages. In early twentieth century literature, writers regularly attributed the word "tabby" to the Spanish tapia, and likewise the English "tappy" to tapia. Many used the terms interchangably (e.g., "a mixture of shells in lime mortar formerly called "tapia" or "tabby.")[4] Albert Manucy has continued this practice in more recent publications. In Houses of St. Augustine he

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[1]See "tapis" in "Plan and Estimate of Repairs Necessary for Fort Lyttleton, 26 September 1775," South Carolina Historical and Genealogical Magazine (1901), pp. 15-16.

[2]Thomas Spalding, "A Sketch of the Life of General James Oglethorpe," Collections of the Georgia Historical Society 1:273.

[3]Spalding to Whiting, 1844.

[4]Henry Smith, "The Town of Dorchester," South Carolina Historical and Genealogical Magazine (1905), p. 62.

notes:

> Mixed with sand, it [lime] formed the mortar used to lay up brick or stone. With sand plus an aggregate such as pebbles or shell, it was "tapia" or "tabby" - a versatile material much like modern concrete and suitable for walls, roofs and floors.[1]

Since 1950, however, Webster's New International and some of the other dictionaries have given an African derivation for the word. They cite as their authority Lorenzo D. Turner's Africanisms in the Gullah Dialect.[2] In this work, Turner traced "tabby" to the Gullah word tabi, as in "tabi heus," and noted that it was akin to the Woloff word tabax - wall of a house made of sand, lime, or mud; the Arabic tabix - cement, mortar and brick; the Hausa word tabo - mud, and the Konga word ntaba - muddy place. Two assumptions were basic to the etymology: 1) that the Gullah tabi is an "Africanism," a word attributable to one or more of the African languages, and 2) words with the same stem and similar meaning are related (in this case tabi to tabax, tabo, and ntaba.) But is tabi an Africanism? The weight of evidence suggests that it is not.

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[1]Manucy, 1962, p. 17.

[2]Chicago: Univ. of Chicago Press, 1949, p. 202.
Gullah is the distinctive speech of the Sea Isalnd "Black community." Historically, it evolved from the pidginization of English, which began in West Africa and continued in the Caribbean and in the southeastern part of the United States. It was influenced linguistically by Portuguese, Spanish, French, and Dutch, but most of all by the West African languages. African contributions largely came from the tribal languages of Senegal, Gambia, Ghana, Liberia, Sierre Leone, Ivory Coast, southern Nigeria, Gabon and Angola, areas which supplied the majority of the slaves to the Sea Island rice, indigo, cotton and sugar plantations. Peter H. Wood, Black Majority: Negroes in Colonial South Carolina from 1670 through the Stone Rebellion (New York: Alfred A. Knopf, 1974), pp. 173, 334-335; See also James P. Comer, "Social Power of the Negro," Scientific American (1967).

Tabby (Tabi) - a questionable Africanism

Numerous errors have been found in Turner's work, which include errors in methodology. The narrow scope of the work and his reliance on dictionaries and published word inventories were the principal methodological criticisms.[1] His errors in scholarship were much more serious, and aptly illustrated in his etymology of tabi. Here he listed four "related" African terms, several form languages which only minorly contributed to Gullah (e.g., Hausa and Arabic), the others whose meanings may be seen as only distantly related.[2] Reexamination of Turner's sources has revealed several discrepancies. First, the word tabax does not appear in any of the references pertaining to the Woloff language, that are listed in Turner's bibliography. Second, the words tabo and ntaba have not been properly defined. The Hausa word tabo in its fourth sense means "mud," but specifically the mud around a well or in a market place.[3] Likewise the Kongo word ntaba usually is defined as a swamp, marsh, and lastly as a muddyplace.[4] Placed in contest, the meanings of the two African words bear little relationship to that of the Gullah tabi, a building material ". . . made of cement and oyster shells with which pieces of brick are

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[1]Turner's work has a definite "African" bias. It takes the approach that non-English words in Gullah are likely Africanisms, and as such traceable to West African languages, but fails to access the contributions of the European languages to Gullah.

[2]The major contributing languages to Gullah were Bambara, Fula, Kongo, Mende, Vai and Woloff.

[3]Rev. G. P. Bargery, A Hausa-English Dictionary and English-Hausa Dictionary (London: Humphrey Milford, 1934).

[4]W. Holman Bentley, Dictionary and Grammar of the Kongo Language (London: Baptist Missionary Society, 1887), p. 396.

frequently mixed."[1]

Multiple derivation of tabby

As discussed by Frederic G. Cassidy in "Multiple Etymologies in Jamaican Creoles," American Speech, multiple etymologies are said to refer to those words which seem to be derivable with equal plausibility from two or more languages known to have been in contact at the time of their formation. Regarding the etymological derivation of a word so categorized, Cassidy stated:

> The word should not be assigned to either, or to any one of the putative source languages - that on the contrary it must be assigned to them jointly . . . This is not merely the result of the absence of historical evidence, which leaves the etymologist unable to decide a priority in favor of one of the languages concerned, rather it implies the proposition that in some instances at least the words in question are due to literal combination or conflation.[2]

In subsequent articles in linguistic journals, word formation of this type has been referred to as "syncretism," which has been observed operating on several levels in the pidginization/creolization process. It is possible that tabi may be an example of simple syncretism; its origin may lie in a blending of forms. As one Creolist noted: "The most obvious form of lexical pidginization is found when one (or more) African forms blended with one (or more) European forms, resulting in a new or restructured pidgin item. The parent forms need not have been closely analogous in form or meaning."[3]

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[1]Turner, p. 202.

[2]Frederic G. Cassidy, "Multiple etymologies in Jamaican Creole," American Speech 41 (3): 211.

[3]Jay Edwards, "African Influences on the English on San Andres Island, Colombia," Pidgins and Creoles, ed. David DeCamp and Ian F.

Table 6 lists possible parental forms for the Gullah tabi. Included in the inventory are words with tap and tab stems from a number of languages, all with demonstratable links with Gullah. With the possible exceptions of the Hausa tabo and the Kongo ntaba, the terms have somewhat similar meanings; some due to linguisitic borrowing that took place in a more remote era and others to onomatopy.[1] Linguistic borrowing is most evident among the European and North African language groups. The Portuguese taipa and the Arabic-Berber tabiya were both derivatives of the Spanish tapia, a word meaning kneaded and tamped earth or a wall of tapias.[2] Since the Portuguese and Arabic terms spawned others (viz., Ar. tabbi, Turkish tabiya, etc.), perhaps even those in some of the West African languages, one sees tapia as the antecedental term for a good portion of the indicated terminology. The word's etymology confirms the relationship.

Tapia and its derivatives: some etymological relationships. The Spanish scholar Joan Corominas devoted several pages in his etymological work to tapia. He commenced with the statement: "tapia - an ancient word common to the three hispanic Roman languages and to Langue d'oc, propagated from Spanish to Arabic even into Turkish." Corominas considered the term far older than its earliest

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Hancock (Washington: Georgetown University, School of Languages and Linguistics, 1976), p. 7.

[1]Onomatopy: The possibility that onomatopoeia (the formation of words in imitation of natural sounds, e.g., tap = tamping) has produced in different languages similar but genetically unrelated words.

[2]Aniceto De Pages y Jose Perez Hervas, Gran Diccionario De la Lengua Castellana (Barcelona: Fomenti Comercial Del Libro Cortes 581), pp. 358.

TABLE 6

WORDS WITH TAB AND TAP STEMS IN SPANISH, PORTUGUESE, ARABIC, TURKISH, ENGLISH AND WEST AFRICAN LANGUAGES

	Hispanic-Latin	Spanish
tap - possibly onomatopoetic (crushing sound-tap)	tapia	tapia: rammed earth (Castellan), mud wall, massive eall tapial: mould for making mud walls tapiar: to stop up with a mud wall tapiador: builder of mud walls tapieria: series of mud walls
Same stem as:		
Langue d'Oc tap: clay, argil atapi: crush with feet		Portuguese taipa: mud wall, partition wall of mud taipal: plaster wall, mud wall taipar: to make a mud wall taipa parapeitos: breastwork of mud-work
Provencal atapir: crush with feet		
Catalan atapeir: press close tapas: clay		Arabic tabiya: earth, lime, pebbles rammed between forms tabbi: a mortar composed of lime and earth tabix: cement, mortar tawwab: one who makes tapias
		Turkish tabiya: rampart, bastion, battery
		West African Languages Wolof - tabax: the wall of a house made of sand, lime, mud, etc.; to build of earth Hausa - ta_2bo_2: mud Kongo - ntába: a muddy place
		English tappy: a cement of oyster shells with a mixture of lime and water tappywork: same as above

SOURCE: Pages y Hervas, p. 358; Corominas, p. 373; Turner, p. 202; London Magazine 1745, pp. 395-396 and 1747.

documentation in 1222. The word supposed an hispanic-latin "tapia" of uncertain origin, probably derived from "tap," and onomatopeia from tamping. Other words based on the same stem were in Langue d'Oc - tap = clay, argil, and atapi - crush with the feet; Provencal - atapir = crush with the feet; and Catalan - tapas = clay, atapeir = press close.[1]

Descriptions of rammed earth buildings appeared in Arab writings by about the tenth century. The oriental traveler Abenhaucal mentioned tabiya in his description of Spain, and later the Moroccans Idrisi (twelth century) and Abenadari (thirteenth century) used the term. It was also featured in the Arabic writings of Toledo (1286) and in Ramon Marti (thirteenth century). By the fourteenth century, the term tabiya (tabia) was so firmly established in North Africa that the Tunisian Abenjaldun created an Arabic derivative tawwab: one who makes tapias. In modern usage, the term extends not only to the Arabs and Berbers of Algeria, but also into Egypt and Lebanon. From Arabic, the word entered Turkish as tabiya in the military sense, that is as a rampart, bastion, redoute, battery, etc.[2]

Because of the term's common usage in North Africa and in parts of Southwest Asia, early etymologies considered tabiya indigenous either of Arabic or Turkish origin.[3] But as Corominas liked to point

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[1]Corominas, pp. 373-374.

[2]Ibid.

[3]G. Baist, Kritischer Jahresbericht uber die Fort-Schritte der romanischen Philologie (Munich-Erlangen: P. P. K. Vollmoller, 1892), 6: 396; K. A. F. Mahn, Etymologische Untersuchungen auf dem Gebiete der romanischen Sprachen (Berlin, 1854), pp. 70-71.

out:

> . . .we have already seen that the first Mussulman who discusses the item describes it as native to Spain; it is a term foreign to classical Arabic and to puristic writers and dictionaries, and if it were of Arabic origin in the Roman language, it would be difficult to explain the -p-,[1]

Borrowing also was important between Arabic-Berber and the West African languages. Interregional linguistic exchanges date from at least the eighth century, though Berber trade with the Sudan was established as early as the sixth and fifth millenia B.C.[2] Significant expansion of the trans-Saharan trade, however, occurred in the eighth century when Muslim Arabs enclosed the land of North Africa in a new social, political, and relgious system, and in doing so, promoted a wide system of trade and cultural interchange throughout North Africa, southern Europe and Southwest Asia.[3] Trade items from West Africa were gold, ivory, slaves and kola nuts, which were exchanged for salt, copper, silks, and metalware (e.g., pots, pans, and swords), from North Africa, Europe and Asia. Early in the Muslim period the heaviest trade was on the western Trans-Saharan routes between Morroco and Ghana (see Map 5).[4] Along the routes, trading settlements emerged, a few of

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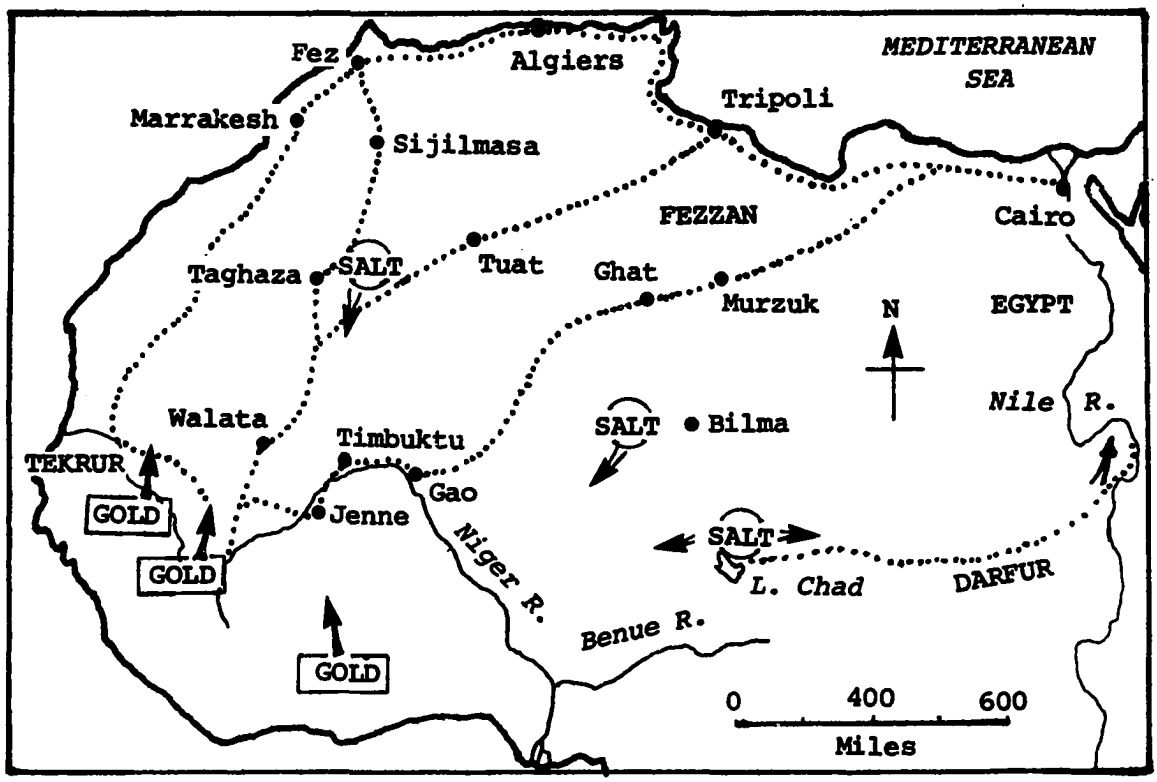
[1]Corominas, p. 373.

[2]Roland Oliver and J. D. Fage, A Short History of Africa (New York: University Press, 1964), p. 61.

[3]Basil Davidson, A History of West Africa to the Nineteenth Century (Garden City, New York: Anchor Books - Doubleday & Co., Inc., 1966), p. 33.

[4]Oliver and Fage, p. 89.



Map 5. Trade and Trading Routes Across the Sahara in Early Times

which attained city-size and acquired city functions. Trading cities, especially those of the western Sudan, grew in wealth and stature, expanding their influence over neighboring settlements. By A.D. 1050 the Sudanese cities of Kumbi Saleh, Tekrur, Niani had become ruling capitals over a series of trading states or empires, respectively, Ghana, Tekrur, and Mali. In close proximity to the capital cities and other large settlements lay the "towns of the Muslim traders," in which North African building traditions were perpetuated and from which possibly they diffused.[1] In his description of Ghana in about A.D. 1065, al-Bakri reported the town of the Muslim traders was six miles away from the emperor's own city. Affluent traders, he noted, built their houses of stone, according to the customs of North Africa.[2] Perhaps other buildings were of tabia. If so, it offers an explanation for an early borrowing of the terms tabia and tabix by West African groups.

The Woloffs' migration history and proximity to the great trading states made them especially susceptible to the cultural influences of Ghana, Mali, and Tekrur at a time when the Arab-Berber presence in the western Sudan was particularly strong. Davidson in

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[1]The flat roofed adobe-brick square or rectangular house, now found in West Africa along the Volta River and along the bend of the Niger River among the Bambara and the Bozo, among the Guang of inland Ghana, the splinter populations of central Togo, and in the ancient cities of the central Sudan (Zinder, Sokoto, Kano, Bida) was believed to have been introduced through this agency. See Julius Gluck, "African Architecture, in Peoples and Cultures of Africa, edited by Elliott P. Skinner (Garden City, N.Y.: American Museum of Natural History, 1973), pp. 236-237 for discussion of the adobe rectangular house in Negro Africa.

[2]al-Bakri, Kitab al-Masalik wa'l Mamalik (Cordoba, 1067), trans. by M. G. de Slane, 2 vols.- Paris, 1859. Cited in Davidson, pp. 41-42.

A History of West Africa to the Nineteenth Century maintains that sometime prior to 1300 a people moved "westward from the Sudan" to settle in the Sene-Gambia region.[1] Mingling with the indigenous Serer, they formed the state and then the empire of Woloff. In the fourteenth century The Woloff states (Wala, Cayor and Baol) lie amidst Mali-controlled territory. The city-state Tekrur, under the sway of Mali was located to the north of Woloff and the lands of Mali to the south and east (see Map 6). Presumably trade and other social-economic interchanges took place between the adjacent states, making linguistic transfers possible. Thus, tabia or some derivative of the word might have entered the Woloff language at this time, if it had not been incorporated previously. Linguistic borrowing, of course, could have occurred at a later date, though under far less favorable circumstances. With Mali's demise about 1400 and the rise of Songhai (1010-1591), the centers of political and economic power and the flow of trade shifted eastward.[2] In the first half of the fifteenth century the Woloff state continued to grow in wealth and prestige, but without a strong imput of ideas and inventions from the Arab-Berber lands north of the Sahara. After 1442, the beginning of the Portuguese trade in African slaves, the Senegal region was opened to Europeans.[3] From

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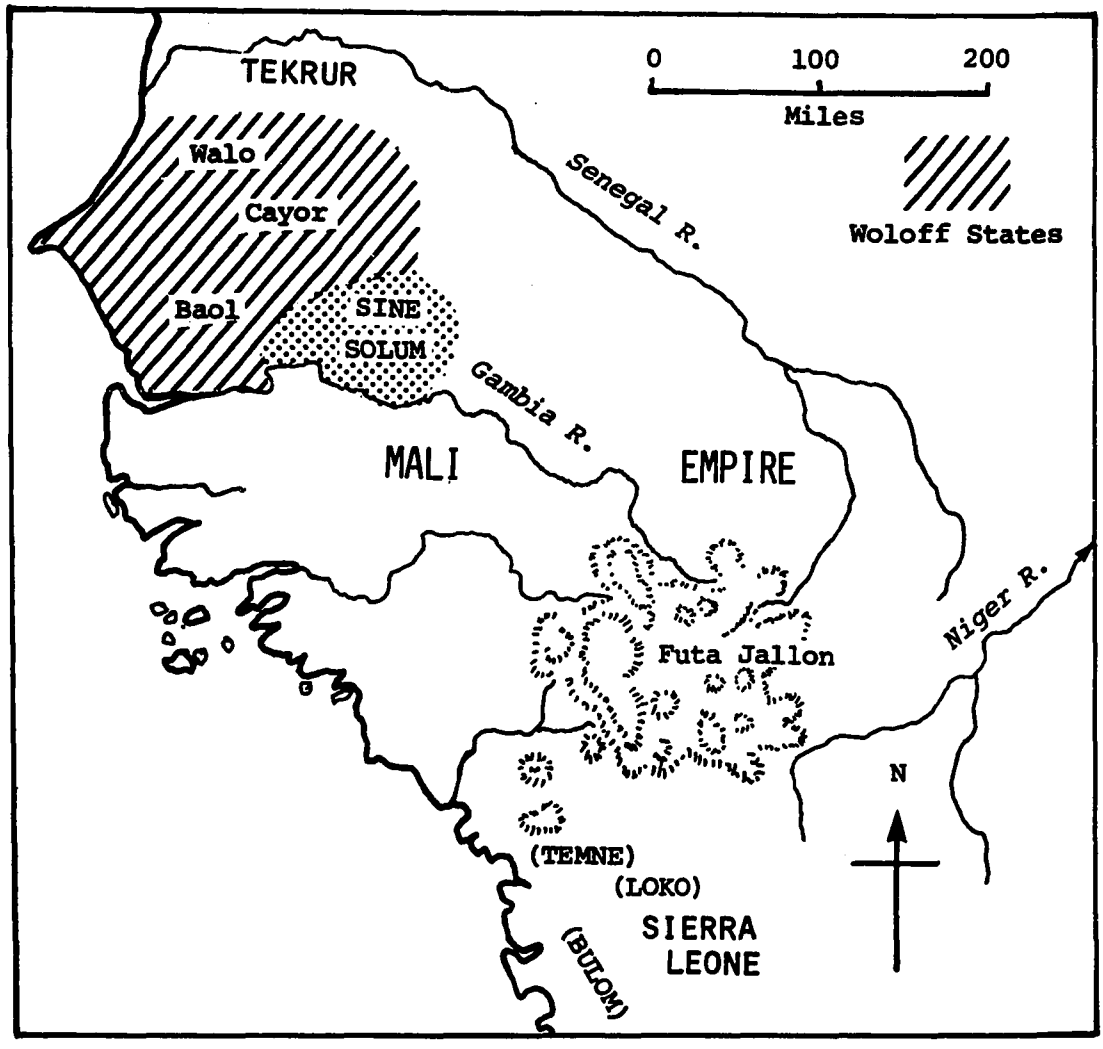
[1]Davidson, p. 61

[2]The region's exports began to flow east down the Niger to new centers like Timbuctu and Gao before crossing the desert along more central routes.

[3]Davidson, p. 111



Map 6. Peoples and Cultures of the Western Sudan

that time to the mid-nineteenth century, the most important foreign influences, linguistic and otherwise, were from western Europe, rather than North Africa.

Arab-Berber influence on West African cultures was not confined just to the western Sudan (see Map 4). As trade intermediaries between the forest peoples of the south (mainly the Yoruba) and Tunisian traders of the north, the Hausa of northern Nigeria (in the central Sudan) had opportunity to acquire any number of Arabic words and other culture traits. Indeed northern culture significantly affected life in Hausaland beginning in the fifteenth century. For example, after 1400 most of the Hausa kings accepted Islam and the "methods of government accordingly changed."[1] Between 1400 and 1800 the Hausa cities, most notably Kano and Katsina, became great commercial centers, often visited by Muslim scholars. In the same period Hausa merchants and governments adopted Arab script to record the Hausa language. On the strength of these cultural links, tabo, the Hausa word for mud, could be related to the Arabic tabia, rammed earth or tabbi, a mortar of lime and earth, though probably not to the Gullah tabi, or the English tabby. Hausa slaves after all were rare on American plantations. Reasons for this include the less accessible location of the Hausa states relative to coastal slaving activities, the Hausa position as an affluent trading and industrial people and their strong economic orientation to the north.

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[1]Ibid, p. 90.

Derivation of Tabby Roofs and Their Construction Similarities With Old and New World Types

The Spanish were far more versatile in their employment of tabby than later English builders. The principal reason for this would seem to have been the relative ease with which the Spanish were able to incorporate tabby into traditional types of construction. For example, they used the material in St. Augustine for flooring, outside pavements, flat and vaulted roofs, yard walls and housing. Much of this construction would seem closely related to that found in certain areas of Spain, North Africa and of Spanish-speaking New Spain. The tabby slab roofs (azotea) of St. Augustine bore a marked resemblance to azoteas elsewhere. Construction was basically the same as that described for sixteenth and seventeenth century flat roofs in Puerto Rico, Mexico, and Peru.[1]

Since there was no aboriginal tradition for the flat roof in Florida, the idea for it either came directly from the Old World or indirectly via the Caribbean or perhaps even Mexico, northeastern Mexico or Yucatan.[2] Archaeological evidence suggests a Middle Eastern origin. Its antiquity in this region dates to at least 6,500 B.C.[3] From there, the flat roofed house seems to have spread eastward to

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[1]de Hostes, pp. 62, 67-69; Ada L. Newton, "The History of Architecture Along the Rio Grande as Reflected in the Building Around Rio Grande City, 1749-1920" (M.A. thesis, Texas College of Arts and Industries, 1964).

[2]Robert C. West, "The Flat-Roofed Folk Dwelling in Rural Mexico," Geoscience and Man 5 (June 1974): 122.

[3]J. Mellaart, Earliest Civilizations of the Near East (New York: McGraw-Hill, 1965), p. 80.

central Asia and westward across northern Africa.[1] It is not known when it reached northwest Africa. The date of its introduction may well have coincided with that of tapia, another Middle Eastern derived culture trait. It is believed that the Arab-Berbers of northwest Africa introduced the flat roof to Andalucia, where it is still a common roof type in certain districts. Today, it occurs along the dry southwestern fringe from Cadiz to Alicante, but is most common around Cadiz, in Alpujarras region of southern Spain, and in the coastal plain and river deltas of Almeria Province.[2]

From southeastern Andalucia, the flat-roofed house was brought to the New World and introduced into Spanish settlements in certain parts of Mexico, Peru, the Caribbean and Spanish Florida. R. C. West has suggested that its success in central Mexicio and the northern plateau, especially in later mestizo settlements, may stem from the prestige value attached to flat roofed dwellings in Mexico, which predated the Spanish occupation. West also has noted that its occurrence on the Yucatan Peninsula presents a special case, in that there was no Indian tradition for such construction. Despite this, by 1579, ". . . all Spanish town houses in Merida and some in Valladolid were of rubble masonry and had flat roofs."[3] In Yucatan the flat roofed house became a symbol of Spanish wealth and power.

Though dominant in certain sections of Mexico, the flat roofed house was not the most common style there. It was even less abundant

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[1]West, p. 125; Julius F. Gluck, "African Architecture," Peoples and Cultures of Africa, An Anthropological Reader (Garden City; N. J.: Doubleday Amer. Museum of Natural History, 1972), p. 237.

[2]West, p. 125.

[3]Ibid., p. 129.

in some other Spanish colonial areas. The flat roof had limited popularity in Spanish Florida and the Caribbean. Even when in vogue in St. Augustine, flat roofed houses only accounted for eight percent of the total (23 out of 213 houses surveyed in 1759).[1] Generally the flat roof was found on the more prestigeous structures, those with municipal functions or the housing of the wealthy, though it also was associated with at least six common-plan houses (one or two room structures). Nearly all flat-roofed structures in St. Augustine were built of stone masonry (coquina). Albert Manucy attributed the selection of the material to the need for strong walls to support the heavy tabby slab roofs, though the prestige value of stone may have been an equally important determinant.

The small number of flat roofed structures in St. Augustine no doubt can be attributed to the absence of cultural or historical precedence, rather than negative attitudes relating to the form. The gabled roof, covered with palm thatch or board, was dominant in St. Augustine. This was the type favored in the Spanish provinces of Extremadura and western Andalucia, regions which supplied a substantial number of early immigrants to Spanish Florida and served as the two most important donor areas of Hispanic folkways to the New World.[3] During the Spanish colonial period the Moorish flat-roofed house is believed to have been most prevalent in southeast Andalucia and rare

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[1]Solana to the Crown, 1759.

[2]Manucy, Houses of St. Augustine, p. 108.

[3]George Foster, Culture and Conquest, America's Spanish Heritage (New York: Viking Fund Publications, Anthrop., 1960).

in western Andalucia and Extremadura.[1]

Besides not being a traditional form, the roof type was climatically ill-suited to Florida. Innumerable problems must have arisen in the attempt to maintain flat roofs in an area receiving fifty to sixty inches of precipitation annually. Flat roofs are more common in areas of moderately low to low rainfall where, if properly constructed and regularly maintained, they may last for a century or more. They were made watertight by diverse means, which varied according to cultural tradition, time in history, and local requirements. Archaeological materials, descriptive accounts, and contemporary construction have provided good evidence for historical practices.

From the excavation of a Middle Eastern house site, dated to 1700 B.C., Lawrence has described the ceiling construction of a middle Helladic House of the Lower Euphrates Valley. It consisted of a series of beams and cross timbers, overlaid by a "chattoc" matting, followed by reeds and a second layer of matting sealed with "mutly" a mixture of mud and chopped straw made watertight by a sandwich layer of bitumen.[2]

On the northern coast of Africa, flat roofs were protected either by a tamped layer of mud or by a layer of mud mixed with a little lime. Englishmen Henry W. and Frederic W. Beechey, recounting their visit to the town of Misratch (Libya) in 1821, reported:

> The houses are only one story high, and are built with rough stones and mud; the roofs are flat, and formed with slight rafters, covered with mats and a quantity of sea-weed, over which is laid a thick coat of mud, smoothed and beat down very carefully. They are

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[1]West, p. 125.

[2]Davey, p. 52.

> fortunate who can mix a little lime with the mud which forms the outer part of their roof; for without this addition it is wholly incapable of resisting the heavy rains which assail it in winter, and a thick muddy stream never fails to find its way, through the numerous mazes of sea-weed and matting, to the luckless inhabitants below.[1]

The flat roofed house of north Africa would seem to have served as the prototype for the flat roofed houses of southern Spain and the savanna country of west African littoral.[2] The Spanish flat roofed house has been portrayed as rectangular, usually one story in height, of whitewashed adobe or masonry construction; with tamped earth floors, and "with slightly inclined clay or mortar-covered roofs and long drain spouts extending from the parapet."[3] The New World version of

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[1]Henry W. Beechey and Frederic W. Beechey, Proceedings of the Expedition to Explore the Northern Coast of Africa from Tripoly Eastward in MDCCCXXI and MDCCCXXII (London: John Murray, 1828), p. 89.

[2]Flat tamped earth roofs were especially common in the Cape Coast area of west Africa. Alcock detailed the construction of the Cape Coast flat roof as follows:

> "Here flat roofs are made by laying rough poles 4 to 6 inches in diameter out from the bush at intervals of about 15 inches as joists, with their ends intersecting the walls. Smaller sticks are then placed tightly together over the joists to form a platform. A mixture of lateritic clay and sand which a very small quantity of slaked lime has been added is then prepared and laid over the platform. The mixture is rammed into position and its surface screed off in such a manner that substantial falls are obtained to the rain-water outlets. The thickness of the lime-earth mixture therefore varies from 18 inches or more to 8 inches.
>
> Parapet walls intersected by outlets for rainwater are built up all around the roofs over each room. Metal or wooden chutes 12 to 18 inches wide are then affixed to the wall, thus allowing the rainwater to drain clear of the walls. A. E. S. Alcock, "Rammed Earth Technique in West Africa," Housing and Town and Country Planning (New York: United Nations, October 1950, Bulletin No. 4), p. 54.

[3]West, p. 125.

the Spanish flat roofed house maintained much the same form, construction, and materials. Historically, this can be demonstrated in the housing of Mexico, Puerto Rico and Spanish Florida.

The mortar-covered or slab roof was especially widespread, with tamped earth roofs favored only in areas of extremely low precipitation (e.g., western Sonora and west-central Coahulia, Mexico).[1] Though the construction method remained basically the same whereever it occurred, there was regional variation in the mortar mixture, certain preparatory techniques and in the measurable thickness of the mortar slab. These differences can be demonstrated in the seventeenth century roof construction of Cerralvo Palace (Cerralvo, Mexico), the terrado of Ponce De Leon's house (Caparra, Puerto Rico), and what is known concerning the tabby slab roofs of St. Augustine. The roof of Cerralvo Palace was constructed with beams 25 ft. in length and 8 to 10 ins. square, capped with a 12 in. thick mortar slab. Ada Newton, in a study of the palace, provides a number of construction details.

> Rubble mixture was laid on in approximate 3 inch layers, each limed and allowed to dry for 24 hours and the process was repeated until the layers were almost 12 inches thick. The roof was left higher in the center, so the rain would drain to the front and to the back. Drains were concealed in the front of the building with an opening at the base.[2]

In contrast to the roof of Cerralvo Palace, the terrado of Ponce De Leon's tapia house was formed from a single layer of material, approximately 6 3/4 inches thick, supported by a set of beams, 9 to 11 inches in width and covered with red brick tile.[3] It was comprised of

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[1] Ibid., p. 115.

[2] Newton, p. 51.

[3] de Hostes, p. 62.

a special mixture of earth, sand, ripio, limestone and lime. Adolfo de Hostes had samples of the terrado and mortar used in other parts of the house analyzed in the laboratory. The laboratory results are recorded in Table 7.

TABLE 7

ANALYSIS OF MORTAR AND TERRADO AT CAPARRA

Components	Mortar %	Terrado %
Sand - silica, quartz (SiO_2)	29.74	43.12
Quick lime (CaO)	36.40	26.66
Carbonic acid (CO_2)	24.20	19.70
Other components:		
Aluminum oxide (Al_2O_3)	3.49	2.55
Iron oxide (Fe_2O_3)	1.43	2.23
Magnesium oxide (MgO)	.34	.32
Water (H_2O)	.90	1.26
	3.18	3.08
Titanium dioxide (TiO_2)	vestiges	.14
Maganese oxide (MnO)	.02	.10
	99.70	99.16

SOURCE: de Hostes, p. 67

Table 7 shows that the two samples contained the same basic components, but differed substantially in the proportioning of ingredients. Lime predominated in the mortar (by proportion, slightly over one third), and sand in the terrado (by proportion, nearly one half). The terrado, it seems, was constructed with relatively low grade mortar, which in de Hostes' words, ". . .must of necessity have been covered with brick, slate or some other impermeable material."[1] De Hostes reports that the terrado at Caparra was covered with red brick tiles, laid in mortar

[1] Ibid., p. 69.

which he says were imported from Seville, probably through Santo Domingo.[1]

The masonry roofs of St. Augustine shared certain constructional characteristics with both the flat roof of Cerralvo Palace and the terrado of Ponce De Leon's house at Caparra. Appraisals from the late seventeenth and mid-eighteenth centuries refer to their construction as beams and boards (vigas and tablas), ". . .topped by a pour of masonry."[2] The azoteas manifested the material characteristics of the flat roof of Cerralvo Palace, and the technical characteristics of the terrado at Caparra. The flat roofs of St. Augustine and that of the Mexican Palace were comprised of similar materials: boards and impermeable masonry. Roofs constructed of tile and masonry in St. Augustine were the exception; only one example has been confirmed, though they had been a relatively popular roof style in the Spanish Caribbean since the sixteenth century.[3] Tabby flat roofs and the terrado of Ponce De Leon's house in Puerto Rico had certain technical characteristics in common, such as the procedures for laying the masonry slab and the relative thickness of the masonry roof. Documentary materials indicate that the slab roofs of St. Augustine, like the

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[1] Ibid., p. 68.

[2] "Discrezion de la Planta del Castillo . . ." MS. tracing of the plan key of St. Augustine, 1686.

[3] Yellow clay tile fragments, recovered at the foot of Treasury Street in 1959, were presumed to have come from a flat roof - the last of the azoteas - known to have been destroyed by fire in 1918. The fragments of tile have proved to be very close in size to the flat, red tile (3/4 x 5 x 10 1/4 ins.) used for azotea construction in the Caribbean since at least the seventeenth century. Manucy, Houses of St. Augustine, p. 105.

terrado at Caparra, generally were formed from a single layer of material, probably dry mixed and tamped thoroughly to obtain density sufficient to ensure impermeability.[1] Judging from the thickness of tabby floor slabs, roofs of the material probably were no more than three to six inches thick, which was comparable to the measurable thickness of the terrado of Ponce De Leon's house.[2]

Three factors would seem to determine the thickness of masonry roofs: tradition, usage and quality of masonry. Significant variables include type and size of structures and means of waterproofing. The flat roof at Cerralvo was associated with a rather large administrative building, whereas the roof style at Caparra and St. Augustine, with the exception of flat roofs at the Castillo de San Marcos, was found with modest size residences. As a means of waterproofing, the azotea at Caparra was covered with tile, those in St. Augustine and at Cerralvo with impermeable masonry. In the latter cases two approaches were used to ensure impermeability; one involved multiple pours of masonry (e.g., the flat roof of Cerralvo Palace) and the other, the development and use of high grade mortar/concrete (e.g., the tabby roofs of St. Augustine).

It seems certain that the high quality of tabby masonry allowed for thinner roof slabs, though the type and size of flat roofed structures also were determinants of roof thickness in St. Augustine. Forts, magazines, barracks, etc. had different roofing requirements than private residences. Tabby flat roofs at the Castillo de San

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[1]Hazen to Gritzner, Feb. 1972.

[2]See pages 174-76 for discussion of tabby floors.

Marcos served both as battlements and as roofing for the rooms below, which required that they be strong as well as impermeable. They had to be able to support men and heavy equipment, resist bombardments, and effectively combat weather elements. Construction of the flat roofs at the Castillo reflect these concerns. The vaulted roofs are from ten to twenty inches thick and constructed entirely of tabby concrete.

Tabby Flooring: Some Old World Antecedents

Antecedents for tabby flooring are more difficult to establish than those for tabby walls and flat roofs. The idea may have originated with the Romans, who then introduced it into Spain, or it may have come directly to Spain from Arab-Berber culture. Roman builders made considerable use of concretes and mortars in the construction of floors and outdoor pavements. In a treatise on Roman architecture (ca. 27 B.C.), Vitruvius noted that concrete flooring was the most important of the polished finishings, but warned that great pains and the utmost precautions must be taken to ensure its durability.[1] His lengthy instructions on laying concrete flooring have been summarized as follows:

> If the pavement was to be set upon the ground a solid foundation must first be prepared and leveled off. Planks, preferably of winter oak, but at any rate of a uniform material were to be laid upon it next. For an upper story special care must be taken that each plank be fastened with two nails at each end to prevent warping. In either case, the boards must be protected from the lime of the substructure by a layer of fern or straw. After stones the size of a fist (the statumen) had been laid over the surface, concrete must be mixed of lime with either fresh rubble in the proportion 1:3, or old material in the ratio 2:5, applied, and rammed down with wooden staves (vectibus

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[1]Vitruvius, The Ten Books of Architecture, trans. Morris Hickey Morgan (New York: Dover Publications, Inc., 1960), p. 202.

> ligneis) until it was at least 9 inches thick. This is called the rudus. A mixture of pounded terra cotta and lime in the proportion 3:1 was next prepared and spread on until it was 6 inches thick. This is the nucleus. The substructure now complete and ready for the marble, mosaic, or brick which formed the surface.[1]

The procedures associated with tabby floor building roughly paralleled those described by Vitruvius for unfinished concrete flooring. Though the materials were different, the same basic steps were followed for laying the base and preparing the concrete slab. Slab floors in St. Augustine were constructed on a base of board and shell rubble, those in Rome of broad and fist-sized stones. The former were comprised of shell, sand and shell lime, mixed wet, laid in three to six inch thicknesses over a prepared base and rammed into positions; the latter of fresh rubble or old material and lime, applied, and rammed down until it was at least nine inches thick. Surfacing, however, involved different sets of procedures: tabby floors were finished with linseed oil, Roman pavements with an additional mortar layer and a veneer of marble, mosaic or brick.[2]

Evidence for a Roman origin seems convincing. There were similarities in both construction techniques and appearance and opportunities for the introduction of concrete flooring to Spain. Rome ruled Spain for nearly five hundred years. The techniques for masonry floor construction may have been introduced during this time, or perhaps later during the Moorish invasion. The Moors, though possibly not the originators of masonry flooring, may have been the agents of its introduction and popularization in Spain. The three

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[1] Blake, p. 321.

[2] Debrahm, p. 302 quoted in Manucy, "Tapia or Tabby," p.33

factors that favor a Moorish introduction are: 1) the heavy Moorish influence on many aspects of Spanish architecture; 2) the widespread diffusion of Roman building techniques throughout the Mediterranean region; it is possible that tabby flooring, derived from Spanish masonry flooring and Algerian pavement (resame), shared a common Roman heritage; and 3) the close resemblance of tabby flooring to resame slabs and to the plaster floors of Islamic East Africa and the Middle East.

Resame and tabby, for instance, were both concretes, though resame might be better called pseudo concrete.[1] It has been described as sort of Cyclopean concrete comprised of a mixture of local soil and fat lime into which blocks of calcareous stone were rammed.[2] Its principal usage in Algeria has been the construction of foundation slabs. On the clay based soil of Tunis, it has been customary to lay slabs of resame (approximately forty inches thick) prior to any construction. The resame slabs took several months to dry out properly, after which they acquired a resistance that has made their removal difficult.[3]

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[1]The term "pseudo concrete" is applied to a method of building, that make use of the same ingredients as true concrete, but is unlike the latter in that the lime-sand mortar is too weak to bind the aggregate materials into a compact mass. Blake, p. 325.

[2]Andre Marini, "Rammed Earth Technique in France," Housing and Town and Country Planning (New York: United Nations, October 1950, Bulletin No. 4), p. 24.

[3]Ibid.

Tabby flooring and the plaster floors of the East African coast also shared some things in common. Like tabby floors, the plaster floors of East Africa normally were laid on a hardcore of shell (crushed coral rubble), though sometimes on packed earth alone - as in parts of Songo Manara, Husuni Kubwa and the early Jamia of Gedi.[1] Since the oldest floor samples have been found in conjunction with the area's early Islamic architecture, it would seem that plaster floor construction probably was a diffused trait, brought into the region with the Arab conquest and possibly was one of several Middle Eastern traits represented throughout the Islamic realm. Gravel no doubt replaced coral in floor construction in other parts of Islamic Africa. Perhaps concrete flooring supplanted plaster flooring in the former Roman territories of Spain and the southern Mediterranean coast. In these areas Islamic architectural traditions may have fused with the Roman technology. The masonry floors of Spain and tabby floors of the New World, in this sense, may owe their derivation to both the building traditions of Rome and the Middle East.

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[1]Peter S. Garlake, The Early Islamic Architecture of the East African Coast. Memoir No. 1 of the British Institute of History and Archaeology in East Africa (London: Oxford Univ. Press, 1966), p. 20; See also Ronald Lewcock, "Zanj, the East African Coast," Shelter in Africa, Paul Oliver, ed. (New York: Praeger Pub., 1971), p. 85.

Chapter V

FACTORS INFLUENCING THE USE OF TABBY

Factors influencing the selection and use of tabby as a building material in the coastal zone may be divided into three broad categories: economic, social, and political considerations.

Economic

A number of economic factors favored tabby's adoption throughout its realm of utilization. Of paramount importance was the availability and low cost of component materials which were easily procured in the coastal zone with minimal expense other than that of labor. Aboriginal middens and natural shell deposits supplied shell for both the lime and the coarse aggregate in tabby. Sand and fresh water were readily available at or near every tabby building site.

The availability of such materials was one advantage tabby had over the other building resources. Wood was available in nearly every section of the coastal zone, though extensive reliance on timber both as a building material and fuel at times gave rise to local shortages. Deforestation appears to have been one factor influencing the decision to rebuild St. Augustine with stone and tabby after it was destroyed during the siege of 1702. Coquina was the only building stone found in the coastal zone and it was neither abundant nor widely distributed. Outcrops occured from St. Augustine southward to Key West, but were absent within the region extending from Charleston to Jacksonville.

The use of stone was further limited by the relatively small deposits which, in turn, imposed certain economic restrictions on its selection. Good clays for the making of brick were also in short supply throughout the coastal zone, though they were available in sufficient quality and quantity to permit the establishment of some local brick manufacturing. "Savannah grey brick," kilned at Hermitage Plantation in Savannah, was the best known and most popular of the locally produced bricks. The greatest concentration of brick architecture was also in Savannah, with its use decreasing proportionately with distance from the city.[1] On outlying plantations, the cost of transporting bricks from kiln to building site no doubt was a major contributing factor in the decision to select other materials such as wood or tabby.

Additionally, building with tabby required little monetary outlay. Construction expenses included the cost of labor and equipment involved in 1) transporting component materials, 2) the manufacture of lime from shell, 3) the preparation of the tabby mixture, and 4) the construction itself.[2] Even the cost of labor was negligible, when con-

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[1]In the first three decades of the nineteenth century, "Savannah grey brick" gained considerable local popularity both as a backing wall to other masonry veneers and to stucco, as well as exposed brick in solid masonry walls. Historic Savannah (Savannah: Historic Savannah Inc., 1968), p. 43.

[2]Requirements for building with tabby seem to have been relatively simple. Equipment included kilns for preparing lime, mixing platforms, and wooden or metal shuttering for framework construction which could be taken apart and reassembled for each successive layer (see discussion of construction techniques in Chapter II). The hand tools mentioned in the Spalding and DeBrahm accounts of wall and floor construction were common implements of the eighteenth and nineteenth centuries. Specific references were made to the use of levels, plummets, spades and rammers in formwork construction and to light and heavy pestles in the laying of tabby floors. Undoubtedly other tools were employed, their omission from descriptions not presupposing their inclusion in the basic tool inventory.

scripted or slave labor was employed. The major economic variant was the transportation of raw materials to the building site, a factor which appears to explain the close proximity of tabby structures to the sources of shell (shell middens and, to a lesser degree, natural deposits).

After charging a "reasonable hire" for his "negroes," Spalding estimated construction costs for the mansion house on Sapelo Island at $5,000.[1] The house, completed in 1812, was described by Spalding as:

> . . .one story, 4 feet from the ground, and sixteen (16) feet in the ceiling, 20 feet in wall. It is 90 feet by 65 feet in depth, besides the wings. The roof is of tar and sand upon shething paper three fold resting on 2 layers of boards. The house is of the Ionic order.[2]

Wooden houses half the size, he noted, have cost more in his neighborhood.[3] The Sapelo house, was "built by six men, two boys and two mules (one white man superintending) in two years."[4] Regarding requisite building skills and labor productivity, Spalding reported:

> All the art that was necessary was to know the use of the plummet and level, to keep the wals strait [sic] and perpendicular. The process of our labour between March and July, (when only, such work should be carried on) was to be two days in the week employed in collecting the shells and building lime kilns, and four other days in the week in finishing two rounds, or two feet of walls, partitions and all. My black boys always, while engaged in this work gained Saturday; their task was to mix and place in the boxes, properly rammed and leveled, thirty cubic feet of wall, finding his own materials.[5]

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[1]Spalding, "On the Mode of Construction of Tabby Buildings...," p. 620.

[2]Ibid.

[3]Spalding to Whiting, 1844.

[4]Spalding, "On the Mode of Construction of Tabby Buildings," p. 620.

[5]Ibid ., p. 619

Though Spalding's reference to the $5,000 cost of building a mansion house is the only known documentation of monetary outlay for tabby construction, it may be assumed that the material's use was deemed competitive in terms of a building medium. Tabby's low cost would seem to have been an important factor in its selection as a building material in Spanish St. Augustine, British colonial fortifications, and in its popularity on coastal plantations where its most common use was in the construction of outbuildings.

Beside being an inexpensive medium of construction, tabby had several other worthwhile qualities including strength, durability, and resistance to fire. When such properties were sought, the material had obvious advantages over wood, was less costly, and more readily available than either stone or brick. It could withstand fires, storms, and military shelling, factors which led to its popularity in the construction of forts, fort-houses, and powder magazines. Notable uses of the material during the eighteenth century include the construction of two all-tabby forts and portions of a third in Georgia, and that of three all-tabby forts, a hornwork, and a tabby and brick arsonal in South Carolina.

Social and Political

Social factors favoring the selection of tabby as a building material include the Spaniard's predisposition toward rammed earth building and the prestige value of stone in their architecture. Early use of tabby in St. Augustine appears to have been influenced by the Spaniard's familiarity with the use of building earths in construction. The types and uses were markedly similar; parallels existed in styles and classes of housing built of tabby and tapia and in military appli-

cations. These similarities suggest that Spanish builders perceived tabby as being the material substitute for tapia, either because of a development relationship, or due to the similarity of ingredient materials and construction methods.

The prestige value attributed to stone-built architecture in St. Augustine and in British-American provinces was a second factor influencing tabby's acceptance. When properly prepared, tabby closely resembled coquina or shellstone and could be used for similar building purposes. The two materials often were confused. Several writers of the eighteenth century misrepresented tabby housing in St. Augustine and remarked that all houses in the city were of stone. The error was also made during the nineteenth century. George Barbour, writing in the 1880's, concluded that the burned-out ruins of the three-story tabby house, Dungeness, was coquina which had been hardened by fire.[1] The similar appearance of the two materials favored the use of tabby. Only the most prestigious structures in Spanish St. Augustine were built of stone. It was the principal material in the Castillo de San Marcos, various government buildings, and houses of the more affluent citizens. Factors limiting its wider acceptance included the costs of quarrying and transport and the limited supply of coquina on nearby Anastasia Island. For those individuals who were unable to afford or obtain stone, tabby seems to have been an acceptable alternative. It was stone-like in appearance, a characteristic which could be enhanced further by "ashlar" markings in the exterior stucco (Fig. 9).

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[1]George Barbour, Florida for Tourists, Invalids and Settlers... (New York: D. Appleton & Co., 1882; reprint edition, Gainsville: University of Florida Press, 1959), p. 98.

The selection of tabby as a building material was also linked to political events. Histories of the Colonial Period contain numerous accounts of armed conflict between the Spanish and British, both of whom claimed the southern territory. These ongoing hostitilities 1) prompted the building of strong forts, several of which were constructed of tabby, to defend the coastal settlement, 2) restricted access to wood, 3) promoted an awareness of the vulnerability of wood-built settlements to fire hazard, and 4) imposed an opportunity to replace burned wooden structures with those of more durable stone, brick or tabby.

Restrictive Factors in the Adoption of Tabby

It is valuable to speculate on those factors which may have hindered the spread of tabby, as well as those which promoted its adoption. The decision whether or not to build with tabby depended upon a number of conditions. A major factor, of course, was familiarity with the technique. Historically, the communication links between coastal settlements were stronger, of longer duration, and better developed than were those connecting the coast and interior. Diffusion waves emanating from the hearths of tabby building (St. Augustin, Charleston-Beaufort, and St. Simons Island) moved easily northward and southward along established coastal communication routes, but encountered communication barriers to westward penetration. This factor and the tendency of diffusion waves to weaken with distance from the hearths helped to shape the north-south coastal distributional pattern of tabby construction.

Other factors included the proximity of raw materials and the availability of alternative building resources. Inland from the coast,

other materials were more readily available. The components of tabby were both difficult and costly to obtain. Wood was abundant and stone more widespread than in the coastal zone. The time required for tabby construction was an additional limiting factor, the greatest allowance being that given to hardening of the tabby mixture. In this regard, wood, brick, and stone all held a competitive advantage when the materials were available. Spalding's mansion house on Sapelo Island took two years to complete. Work was conducted from the first of March to the first of August. Spalding remarked, "We stop for the season in August and cover up our work from Autumnal storms of our almost Tropical climate, hanging the boxes on the last round."[1] During the work period, laborers were able to produce 720 cubic feet of tabby wall weekly. Spalding's letter to N.C. Whiting contains an account of the mansion's progress:

> My people did me when the materials were at hand, 30 cubic feet each per day, that is, they mixed the mortar and filled in the boxes. My walls were extensive enough to employe six hands for three days to compleat [sic] the rounds, mixing mortar one day and filling in two, thus making two rounds a week...[2]

Too rapid construction had deletarious results. It meant cracking and crumbling in the tabby, which weakened the structure and promoted deterioration. This is one explanation for the rapid disintegration of forts Prince Frederick and Lyttleton, both within fifteen years of their construction. The negative experiences at Port Royal had the effect of discouraging further fort construction and possibly of limiting domestic use of the material. The sight of cracking and crumbling tabby would seem to be psychologically burdensome and may have been a

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[1]Spalding to Whiting, 1844.

[2]Ibid.

contributing factor in hindering a wider acceptance of tabby.

Another contingency for the adoption of tabby was a convenient labor supply. Laying a single round of tabby, approximately 60 cubic feet, took two days and the combined efforts of at least six laborers. Labor came from two principal sources, slaves, and conscripted laborers. Both types of labor no doubt were enlisted in the building of ripio houses in Spanish St. Augustine. On the English speaking coast, tabby building during the second half of the eighteenth century became strongly associated with the coastal plantation and slave labor. This association was maintained up to the time of the Civil War. Dispersal of the labor supply after the war was one, though not the only, factor contributing to the demise of tabby construction in the Southeast. The importance of a convenient labor supply is emphasized by the fact that only two buildings of any size were built after 1865, and they were constructed through the cooperative efforts of the students and faculty of Penn School on St. Helena's Island.

Chapter VI

CONCLUSION

The purpose of this study has been to investigate the cultural-historical aspects of tabby construction with special emphasis on those that provide insights into the cultural processes at work in the development and adoption of the building material. The research examines the nature of tabby, methods of construction, usage, distribution and history in the Southeastern United States, factors influencing use, antiquity and cultural origin of tabby.

Tabby, an early type of concrete, utilized materials available in the immediate natural environment, and therefore was a building form perfectly adapted to the resource base of the Sea Islands and adjacent coast. Sand and fresh water were both present on the Southeastern coast. Shell, important both as an aggregate in tabby and as a source of lime, was procured from aboriginal shell middens and natural shell deposits. Most of the shell material was derived from the former. Though shell middens have been found all along the south Atlantic and Gulf coasts, they appear to have been particularly numerous between Charleston and St. Augustine - an area which coincides with the principal distribution of tabby construction. Also, it's more than coincidental that tabby buildings were located on or within several hundred yards of a shell midden (Fig. 38). The expense of transporting shell to distant building sites would seem to have been a deterent to the

Fig. 38. Availability of shell at the building site (Kingsley Plantation, Fort George Island, Florida)

spread of tabby beyond its existing range.

During its two hundred fifty year history in the Southeast, tabby was employed in a variety of construction uses. Walls, foundations, floors and even roofs were constructed of this material. British and American builders used tabby mainly in walls and foundations, while the Spanish also employed it in floors and the flat Spanish azotea roofs. Considerable diversity also existed in the kinds of tabby structures built during this period. British and American builders used the material in the construction of forts, houses, churches, a school dormitory, an urban tenement, a powder magazine and a variety of plantation out-buildings to name but a few of its employments. The Spanish in St. Augustine used it primarily in the construction of residences and to a lesser extent in fort-building, walls for yards and gardens, street-paving, walkways and well bases (see Table 8).

Comparisons also can be made of construction techniques (see Table 9). Whether of Spanish or English-American origin, the walls of tabby buildings usually were constructed in layers or lift heights. This building method involved two wooden planks, which were set on edge and separated by wooden spreader pins. These were used as forms into which the tabby mixture was poured. Each tabby round was allowed to set before the next lift height was begun. On a few occasions British and Spanish builders incorporated wood with tabby. The combination was referred to as post-and-tabby (Spanish: ostion y postes), which has been described alternately as an elaboration of formwork construction, in which vertical posts were imbedded in the tabby wall during the pouring process and as post and beam structures in masonry curtain walls. Brick, made from tabby, was an English-American innovation and

TABLE 8

KINDS OF TABBY STRUCTURES

Spanish Usages	British-American Usages	
Urban residences	Urban residences	Hotel (1)
Walls - yard and garden	Walls - yard and garden	Martello towers
Roofs for stone houses	Slab floors	Powder magazine (1)
Slab floors	Foundations	Arsenal (1)
Pavement and roof of the fort	Forts	Warehouses
Stairways	Churches	Jail (1)
Street paving	Manor houses	Burial vaults
Foundations	Plantation outbuildings:	Outdoor oven (1)
Well bases	slave quarters	Chimneys and chimney bases
	grist mill (1)	Hornwork (1)
	barns	Walkways
	smokehouse (1)	Seawall (1)
	hospital (1)	Sugarhouses
	carriage houses	Rum distillery (1)
	cistern (1)	Brewery
	cotton gin (1)	Lighthouse (1)
	milk houses	Tenement house (1)
	laundry (1)	School dormitory (1)
	smithy (1)	Community hall (1)
	kitchen (1)	Outdoor cooking pit
		Retaining wall (1)

TABLE 9

CONSTRUCTIONAL USES OF TABBY AND BUILDING METHODS

Use and Building Methods	Spanish	British-American
Wall building techniques		
Formwork	X	X
Post-and-tabby	0	0
Tabby brick	-	X
Roof construction		
Flat mortared roofs	X	-
Pitched tabby roofs	-	0
Floor construction		
Slab Floors	X	0

Key to Symbols: X=frequently used
0=infrequently used
-=no reported examples

moreover, a regional development. It originated either on the Georgia or Florida coast; samples of brick have been found in both areas. Florida has the most extensive collection. Here it was used for a variety of construction purposes, the most notable being the walls of plantation houses and of outbuildings. Construction roofs and floors required different technology. The principal tabby roof style was the azotea (flat roof), which was comprised of a thin tabby slab formed over a supporting deck of boards. For tabby flooring one or more layers of tabby overlaid a well packed base of oyster shell or coquina chipping or a tamped earth foundation. Beating the floor with light pestles and finishing it with linseed oil produced a smooth, hard, shiny surface.

Tabby's distribution pattern in the Southeast would seem to be representative of diffusion from two primary and one secondary centers or hearths. The primary hearths were located at St. Augustine, Florida and Charleston-Beaufort, South Carolina and the secondary hearth at St. Simons Island, Georgia. These centers represent the core areas for the development of the Spanish and English-American tabby traditions.

The St. Augustine center was operable from 1670 to 1821. Between the years 1702 and 1763, over 132 houses were built of tabby (ripio), 24 of tabby and wood (ripio y tabla), and 18 of stone and tabby (piedra y ripio). Houses built of these materials represented 42% of the total known residential construction. The tabby building boom ended in 1763 with the British entry into East Florida. During the period of British occupancy (1764-1783), wood replaced tabby and stone as the dominant building material. By the end of the period, it has been estimated that 12% of the houses were of tabby, 36% of stone, and

48% of wood. The trend continued during the second Spanish period. No new tabby structures were built in this era; older structures were removed or allowed to lapse into ruin. By 1821, the year marking the transfer of Florida to the United States, St. Augustine had all but ceased to function as a diffusion hearth.

Though tabby's popularity in St. Augustine was relatively short-lived, the number of tabby structures built by the Spanish in 62 years (1702-1763) far exceeded those built by the British and Americans over a period of 217 years (1703-1920). Over 174 buildings of tabby or tabby in combination with other materials were constructed by Spanish builders as compared to approximately 100 structures constructed by British and American builders. Differences also existed in the distribution pattern. Spanish tabby was limited to the St. Augustine settlement, while that of British and American derivation was distributed geographically from Charleston south to Jacksonville and in the Manatee River section of southwest Florida.

Charleston-Beaufort area served as a second primary diffusion hearth. It functioned in this capacity from 1703 to 1920 (fig. 39). Charleston-Beaufort was the core area for the early development of the British-American tabby tradition. Early in the eighteenth century, requisite skills for tabby were taken from Charleston-Beaufort to the nearby Sea Islands of St. Helena, and Port Royal and to St. Simons Island on the Georgia coast. Later in the century, they were taken to Datha Island and to the Dorchester settlement on Ashley River. Tabby's principal uses were for fortification and for foundations and walls of residences. The techniques for tabby building continued to spread in the first half of the nineteenth century. By 1842, samples of the

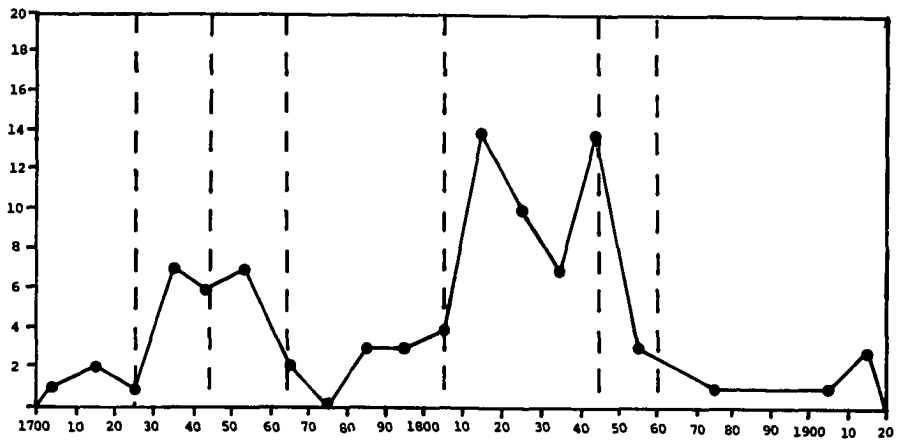

Fig. 39. Summary of Tabby Construction of British and American Origin: 1703-1920

Material also appeared on Edisto Island, Fripps Island, Spring Island, Callawassie Island, Daufuskie Island and Hilton Head; all the latter examples were in conjunction with island plantations, where it was used in the construction of the main residences and in the various outbuildings.

The St. Simons Island hearth was established in 1736 and was active off and on until 1870. It operated as a center of tabby diffusion from 1736 to 1762 and again from 1805 to 1870. The first period of tabby building on the Georgia coast coincides with early settlement efforts at Frederica on St. Simons Island and the establishment of military outposts on Jekyll Island, Isle of Hope, at Brunswick and at Sunbury. The demise of tabby on the Georgia coast in the late eighteenth century was the indirect result of the abandonment of the fort and settlement of Frederica. No new tabby construction was reported for the Georgia coast until 1805. The revival of the building medium in the nineteenth century was due in large part to the promotional activities of plantation owner, Thomas Spalding. Its uses during the nineteenth century were linked closely to the establishment and development of the rice, cotton and sugar plantations on the Georgia Sea Islands and adjacent mainland, coastal North Florida and on the Manatee River in West Florida.

Similar factors were responsible for the demise of the Charleston-Beaufort hearth and the St. Simons Island hearth in the late nineteenth century. The first of these was the general disruption in building activity due to the Civil War, the second, emancipation and the dissolution of many of the coastal plantations in the post-war era, which deprived tabby of its primary area of use and dispersed the labor

supply, and third, the competition offered by the availability of inexpensive commercial Portland cements after 1870.

The two centuries of British-American tabby construction have been summarized in Figure 39. The peaks on the graph mark the periods of tabby's most extensive use in British provinces and American states. The periods between 1725 and 1755 and 1805 and 1855 emerge as the dominant eras. Because of the kinds of structures built, the years from 1725 to 1755 might be referred to as the era of military and twon building and those from 1805 to 1855 the plantation era.

Investigations into the derivation of tabby construction have produced several conclusions. From the examination of documentary materials, archaeological data and linguistic evidence, it is possible to make statements in regard to the derivation of material, usage and construction methods. Evidence tends to support a New World origin for the material. It is thought to be a Spanish development, originating either in Florida or on the Spanish-occupied island of the Caribbean. St. Augustine archaeologists have recovered samples of the material dating to 1675 with historical documents indicating an even greater antiquity. There is no proof at this time of a direct West African connection. Senegalese tabby not only postdated Spanish tabby, but was limitedly distributed and first used in the construction of Portuguese-style housing. The antecedents of tabby would seem to be Old World materials. The Mediterranean building earths: tapia and tabia, Spanish roof mortars and Roman concrete would seem to have had the greatest influence on its development. Four theories have been formulated as to how tabby evolved. The first proposition derives tabby from the Mediterranean building earths, the second sees its evo-

lution in the Spanish roof mortars, the third relates tabby to Roman concrete and the fourth perceives several developmental lines and notes the contribution of each to the evolution of the material. The fourth proposal, which envisions a combination of influences, would seem to be the most valid. It emphasizes the independent development of tabby. Sources contributing to tabby's evolution can be compared to those responsible for the development of Roman concrete. Support for the thesis also comes from linguistic data. The Spanish of St. Augustine never applied the Old World terms: tapia, tapia real, tabia and tabbi nor the word tabby to tabby material. In recognition of tabby's distinctiveness, they devised an entirely new reference vocabulary. Houses constructed of the material were referred to by various designations: casa de ripio, casa de ostion, casa de piedra de ostion, and casa de mamposteria. The earliest use of the term tabby was in eighteenth century English colonial documents. The word tabby came from the Gullah tabi (i.e., tabi heus). Tabi seems to have had a multiple derivation with word associations in Spanish, Portuguese, English, Arabic and several West African languages.

The constructional uses of tabby were another strong tie to the Old World. They were undoubtedly Mediterranean in origin. The Spanish were able to incorporate tabby into traditional types of construction with relative ease. Tabby wall building procedures were the same as those used for tapia and tapia real. The flat Spanish azotea roofs, whether of tabby or a weak mortar mixture, were constructed in a similar manner. Tabby floors also were built according to contemporary standards of floor construction. The masonry floors of Spain were believed to have been their antecedent in the floor building techniques

of Rome and of the Middle East.

A number of circumstances favored tabby's adoption in its realm of utilization. The economic factors influencing its selection and use as a building material were the low cost and availability of component materials on the Southeastern coast, the low cost of building with tabby, its strength, durability and relative resistance to fire. Social and political influences also were instrumental in tabby's acceptance. Important social factors would seem to include the Spaniards' familiarity with the use of building earths in construction and the resemblance of well made tabby to prestigious stone material. Tabby's popularity also was fostered by political-military conflicts. For example, the hostilities between the Spanish in Florida and the British in South Carolina and Georgia during the early eighteenth century gave impetus to the adoption of the building material for forts and fortifications and reason and opportunity to replace perishable wood structures with those of more durable tabby, brick and stone. The factors that hindered tabby's spread also have been examined. A partial list surely would include the absence of familiarity with the technique, the high cost of transporting the raw materials from the coast to the interior, the greater availability of alternative building resources outside the coastal zone plus such practical concerns as the long construction time and particular labor requirements of tabby building.

Continuity of the tabby building tradition was maintained in the coastal Southeast for nearly 250 years. It was fostered by two cultures: the Spanish of St. Augustine and the British and Americans of coastal South Carolina, Georgia and Florida. The tradition's demise began in the Civil War and Post Civil War era. The last date for new

tabby construction was the early 1920s. Present knowledge by necessity has had to come from documentary sources and most important the relict structures. The latter are especially valued as repositories of information on past building practices; they are also reminders of the one-time popularity of the material.

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APPENDIX I

ON THE MODE OF CONSTRUCTING TABBY BUILDINGS, AND THE PROPRIETY OF IMPROVING OUR PLANTATIONS IN A PERMANENT MANNER;

BY THOMAS SPALDING

Dear Sir, I transmit a small book in French, upon the construction of houses of "Terre or Pise," from which, from time to time, I think you may advantageously extract for your work, I have myself long been convinced, that no man who cultivates his own land, should erect upon it wooden or temporary buildings. In the end, and that no very distant one, they cost more than stone, where it is convenient, or tabby, where shells are favourable, or than buildings of compressed earth any where.

One of these three materials offer themselves to the builder in every part of our country, and two of them can be erected without the intervention of more mechanic art than is necessary for the construction of a log house.

This little book informs us that a single province in France has enjoyed the advantages, and been beautified by houses of this material for centuries, without adjacent provinces following the example. This would surprise us, if we had not, upon a thousand other occasions, been compelled to observe the reluctance that is felt by men in adopting any thing that is new. Nor is it more astonishing that the French should have been slow in adopting Pise buildings from the province of the Lyonnois, than that the people of the Eastern districts of Georgia and Carolina, should have so slowly adopted Tabby buildings, from the remains of these buildings left by General Oglethorpe.

The town of Frederica was in great part made up on Tabby buildings, many remains of which are still standing; and while the wooden buildings have been burnt or rotted down, and the bricks been carried off or wasted away, are as entire and imperishable as they would have been of granite or of marble.

I was born in the old town of Frederica, in one of these Tabby houses; I had seen them even sawed up into blocks, like a mass of living stone; and of such blocks, carried from Frederica, are the three first stories of the light house at St. Simon's built. The coating of plaster, which covered these houses, having fallen off, the walls exhibited the manner in which they were constructed, as well as the materials, so distinctly, that there was no difficulty in following the

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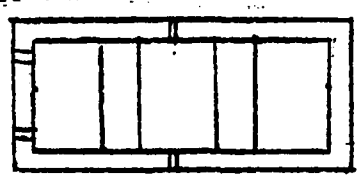
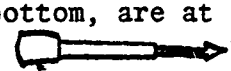
SOURCE: The Southern Agriculturist, December, 1830, pp. 617-620.

example; and the mode is certainly better and more simple than the one described in the French work. General Oglethorpe, doubtless borrowed this mode of building from his neighbours, the Spaniards, but adapted it to the means he had in this country.

Our taller timber trees give us long plank, and instead, therefore, of confining our operations to twelve feet in length, we construct at once a range of boxes to go round our intended building --- as thus [illegible] on the partitions. Spaces for doors and windows,



are left by simply dropping in cross boards between the outer plank, wherever they may be required; so as to leave space enough between them for doors or windows, as marked 1, 2, 3, 4.

The boxes are taken to pieces in a few minutes, at every round of a foot, and are again put together in little more time, because they are kept together and preserved at a proper distance by two means only. First, at the bottom, are at every three feet, round pins with double heads, as thus,  the larger head is on the outer side.

The planks only require to be put together at the end, by joining into each other like a dovetail, where an iron rod keeps them together; the pins are then inserted, and as the boxes descend one inch over the last round of Tabby, the pins keep them together at the bottom, and at the top of the boses, flat pieces at the same distance from each other, and slightly dovetailed, keep the boxes from spreading --in this way -- 

From the causes assigned above, the first house of any magnitude I erected twenty odd years ago, I built of Tabby, and in this way. I was myself, I must acknowledge, astonished at the facility of the work, and the small expenditure of labour that was required; a massy building grew up under the labour of six black men and two boys, and mules, in a few months. They collected their own shells, burnt their own lime, mixed their mortar, consisting of equal parts of oyster shells, lime and sand, removed and filled their boxes-- all the art that was necessary was to know the use of the plummet and the level, to keep the walls strait and perpendicular.

The process of our labour between March and July, (when only, such work should be carried on,) was to be two days in the week employed in collecting shells and building lime kilns, and four other days in the week in finishing two rounds, or two feet of walls, partitions and all. My black boys always, while engaged in this work, gained Saturday; their task was to mix and place in the boxes, properly rammed and leveled, thirty cubic feet of wall, finding his own materials; which would have required even of Charleston brick to build, fifteen hundred and sixty, and which would have cost, I presume, to place in wall, finding lime and labour, which at the utmost, could not be charged at more than $1 a day, or $6 a week. But this is not all, there is not one dollar of actual expenditure to the planter, for he neither buys bricks or hires masons to lay them.

I send you on a plan of this, my first tabby house, copies by a man that I employed to finish some of my wooden work; and although the hurricane of 1824 did some little injury, it does not materially differ from the existing appearance of my house at Sapelo. You will see

the roof is flat; tar and sand are the materials I depend upon for keeping my roof tight, and if there is a good base made of strong joisting, covered over with bricks or tile, repeated coatings of tar and sand will make every thing tight, while it assists to preserve the wood that supports it.

Now you may desire to know what the cost of this house has been, after charging a reasonable hire for my own negroes, and I reply to you $5,000--while wooden houses of half the size have cost more, in my own neighbourhood. I would recommend then Tabby buildings to your readers, wherever shells can be procured for them, or what is quite equal, coarse gravel, if lime is cheap; nor is it necessary to employ more than one bushel of good lime to four of sand and gravel, or four of sand and shells.[1] I have built some of the best Tabby I have ever built, of gravel, lime and sand. And these are the materials which the Tabby of Spain and Morocco is constructed. Some buildings of which materials, are known to be thirteen centuries old.

But where neigher shells or gravel are procurable, clay, or the materials for Pise, every where abound, and offer themselves at an expenditure of labour still less than even Tabby.

APPENDIX II

MS. LETTER, THOMAS SPALDING TO N.C. WHITING,

JULY 30TH, 1844

Dear Sir

Your letter of the 4th of July, but postmarked the 17th, came to hand yesterday; I am old, and very infirm, and with more of writing than I can well do, but it is not in my nature to decline complying with a request conveyed in the manner and the terms of your letter.

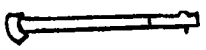
Tabby and not Tappy, as it is printed, a mixture of shells, lime and sand in equal proportions by measure and not weight, makes the best and cheapest buildings where the materials are at hand, I have ever seen; and when rough cast, equals in beauty stone.

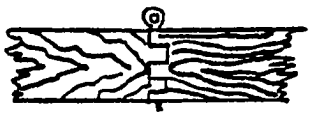
When Gen. Oglethorpe settled Frederica, on St. Simon Island, the island south of Sapelo, and only distant five miles, the fort, his barracks, the entire buildings for his officers and men, were of these materials; Gen. Oglethorpe was a gentleman and a scholar, as well as a soldier, and probably had either seen these buildings in Spain or in other countries along the shores of the Mediterranean; or was sufficiently acquainted with them to determinehim to adopt them, and the Spanish in the adjacent Province of Florida affored him the means of getting men to instruct his own people. My maternal ancestor was an officer of Gen. Oglethorpe; and I was born in one of these houses of Tabby. Frederica was burned down before the revolutionary war and there was left nothing standing but my father's house and one other. Frederica was abandoned but the naked walls stood erect (the most venerable and imposing ruins in the United States,) while within a few years, when it having been discovered that the Tabby walls could be sawn into good building stone, spoilers from every quarter came and have sawed them up and have carried them away. I have given this narrative that you may better understand the value of the material.

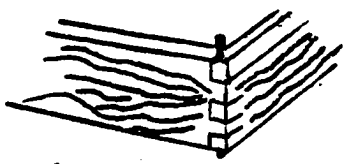
The shells I have used were old shells from ancient Indian Barrows, some of them of great extent scattered over our Sea Islands from Charleston to St. Johns River in Florida. The drift shells, after the oyster is dead, thrown up along the shores of our rivers, are also used, but the salt should be washed out. I have built good Tabby from rough gravel taken up from the bed of the Altamaha, near Darien. Stone broken up by the sledge hammer, if more easily procured, would answer equally well, used the same equal proportions; what we want is a substantial material, upon which the calcarous matter of the lime, and the flinty matter of the sand may unite and set. In my immediate neighborhood, from following my example, there are more Tabby build-

ings than all Georgia besides. There is little art required in the construction of these buildings. A view for fifteen minutes of a house erecting would explain everything.

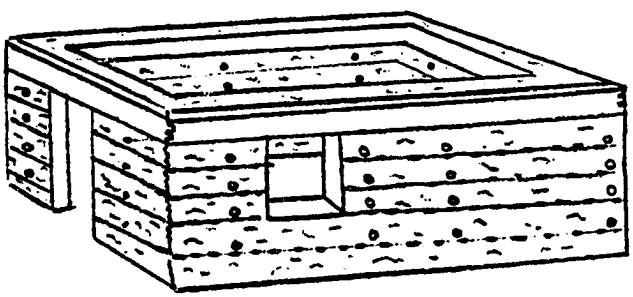
Manner of building.

Two planks as long as convenient to handle, 2 inches thick and about 12 inches wide, are made to unite and to go the round of your building. These planks are kept apart by spreader pins with a double head as thus  , the first head keeps the outer plank in its place, the last with the pin run through the point, keeps the inner plank firm while the workmen are filling in the material and setting it down, either with a spade or a light rammer, which, if shells, bring these into a flat position. Then, the planks at the ends are let into each other thus:

 with an iron wire  with eye to draw it out at each round of Tabby. The corners of the building are thus:

 the same kind of iron wire binding the sides together.

All that is necessary when you construct doors or windows, is to drop a short board across the wall between the outer and inner planks and steady it with two poles, to be drawn out at each round and replaced at the next, and so continue until you have reached the height you intend your doors and windows. When you then drop your Lintall into the Tabby Box so as to secure the next round of Tabby your wall then becomes an intire [sic] whole.



I have attempted to represent with the pen the manner in which the walls are carried round.

The Cost:

My people did me when the materials were at hand, 30 cubic feet each per day, that is, they mixed the mortar and filled in the boxes. My walls were extensive enough to employ six hands for three days to

compleat [sic] the rounds, mixing mortar one day and filling in two, thus making two rounds a week, as much as is prudent ever in Georgia, our rains are severe and our winds higher, and you ought do the same in Connecticut, from the 1st of March to the 1st of August. We stop for the season in August and cover up our work from the Autumnal storms of our almost Tropical climate, hanging the boxes on the last round. If I had received your letter two months sooner I might have found some one who would have received my instructions and communicated to yourself more distinctly my directions, but the season is past for that.

1st--YOUR BEGINNING. The shells are not broken, they are old shells, and I prefer them whole.

2nd--They are not washed, but no salt water should be permitted, as it produces decay. Where the shells have much vegetable mold with them they would be the better for washing.

3rd--They are taken from both natural and artificial deposits, as explained above.

4th--Either shell or stone lime is used, the cheapest is always employed.

5th--I burn my own lime, and use it as soon as convenient after slacking, without the trouble of sifting or other process.

6th--I use pit sand and prefer it, as being free from salt. I like a mixture of fine and coarse sand, but am not particular on that subject. Salt must be avoided, it produces decay.

7th--I generally made my people mix the materials one day and put it into the boxes the two following, very soft, as the better to amalgamate. 10 Bushels of lime, 10 Bushels of Sand, ten bushels of water make 16 cubic feet of wall. I have made my walls 14 inches thick; below the lower floor 2 feet; for the second story 10 inches--beyond that I would not erect Tabby buildings. My house at Sapelo is one story, 4 feet from the ground, and sixteen (16) feet in the ceiling, 20 feet in wall. It is 90 feet by 65 feet in depth, besides the wings. The roof is of tar and sand upon sheathing paper three fold resting on 2 layers of boards. The house is of the Ionic order. This house was built by six men, two boys and two mules (one white man superintending) in two years. I have lived in it for thirty two (32) years. The roof is now as good as the day it was built. Two barrels of tar and two men put on every year a fresh coat, so that it is now 3 inches thick of terrace.[1]

I am fearful you will find it difficult to understand me and yet a glance of your eye in ten minutes would tell all.

and I remain yours
T. Spalding
Sapelo Island, Georgia
29th July, 1844

N.C. Whiting, Esq.,
New Haven,
Connecticut.
N.B.

The Boxes at every round should be taken off and inside up laid over the wall the day you are mixing the material. The pins are one inch above the lower edge of the plank.

VITA

Janet Hazen Gritzner was born June 17, 1943, in Washington, D. C. From birth, until the completion of public school, she was a resident of Washington, D. C. and the suburban community, Silver Spring, Maryland. Mrs. Gritzner graduated from Montgomery Blair High School, Silver Spring, in June, 1961.

In September, 1961, Mrs. Gritzner (then Miss Janet Hazen) enrolled as a freshman geography major at the University of Maryland, College Park. She received a Bachelor of Arts degree in geography from this institution in June, 1965.

Upon completion of the baccalaureate program, she became an employee of the National Security Agency, Fort George Meade, Maryland. She worked for this federal agency from March 1965 until June 1967. In January 1966, she began part-time graduate study in geography at the University of Maryland. Mrs. Gritzner received the Master of Arts degree in geography, with a minor in Russian area studies, from Maryland in January 1970.

In September 1968, Mrs. Gritzner entered the doctoral program in geography and anthropology at Louisiana State University. After two years in residency, she left Baton Rouge to assume a full-time teaching position at East Carolina University in Greenville, North Carolina. She remained in North Carolina for three years, after which she and her husband, also a professor of geography, moved to Missoula, Montana. After two years in Montana and one in Oregon, where both held teaching positions at Oregon College of Education, they returned to the Gulf Coast. Mrs. Gritzner is presently serving on the faculty at the University of St. Thomas, Houston, Texas.

EXAMINATION AND THESIS REPORT

Candidate: Janet Bigbee Gritzner

Major Field: Geography

Title of Thesis: "Tabby in the Coastal Southeast: The Culture History of an American Building Material"

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

March 28, 1978